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Air-Tight Steam Generator.

Attempts have been made for years past to utilize all the heat generated by steam boiler furnaces by burning the fuel under pressure in air-tight furnaces. We believe the principle is successfully used in caloric engines where the products of combustion themselves are used as the motor of the machine. In other instances where the attempt was made we think the failure could not fairly be chargeable to defects inherent in the principle, but in the methods by which it was attempted to reduce it to practice. It can hardly be denied that this method of burning fuel insures the most per feet combustion, and it would seem possible to gain a larger percentage of the heat power for the raising of steam than by the ordinary method. The plan intended to accomplish this result which is represented in the engravings is the invention of George Sill, of Wilkins P. O., Alleghany Co., Pa.

Fig. 1 is a perspective view of the apparatus; Fig. 2 is a longitudinal vertical section, through the center of the two horisontal cylinders, and Fig. 3, a similar section through a portion of the upright cylinder. Similar letters of reference indicate like parts in each figure. A designates the main boiler and B the combustion chambers, contained in a shell inside the main boiler. C are the grates, the bars of which are tubular and filled with water to prevent too rapid oxidation and their consequent destruction. The tubes, D, permit the products of combustion to pass into the shells, E, and thence out through the smoke stacks, F, or through the pipes, G—Figs. 1 and 3—into the smoke chamber, H—Fig. 3—in the auxiliary boiler, I. A check valve, J, at the top of the smoke chamber permits the gases of combustion to expand into the auxiliary boiler, I, and also prevents the water from passing into the smoke chamber. The furnace doors, K, have a lining of fire brick and are suspended on hinged yokes through which pass screws worked by handwheels to set them up snug. Similar doors mounted in the same manner are seen at L, which can be opened to allow the escape of the smoke, etc., into the smoke stacks upon starting the fires and until steam is raised. The ash pits, M, are similarly secured. The pipe at N—Fig. 3—is for blowing out ashes and dirt, and there is a valve for that purpose in the ash pits M. The apertures in the pipes, G, which connect the smoke chamber, are closed by valves, hollow to allow water to circulate through them in order to prevent them from becoming too much heated. They are operated, either singly or together, by the hand-wheels, O, on the top of the vertical boiler. The air necessary for combustion is forced under the grate by a pump or pumps through suitable apertures in the ash pits, and over the grate through the pipes, P. The water is introduced at Q.

The operation of the apparatus is as follows: The doors, K and L, are opened and also those in the ash pit, M, when the boiler is fired in the ordinary manner, the smoke escaping through the smoke-stacks, until the steam is up sufficiently to run the engine. These apertures are closed after the furnace is well charged, and the air is forced through the apertures under and over the grate, the products of combustion being forced by expansion through the pipes, G, into the smoke chamber, H, and thence up through the check valve, J, into the boiler, I, where they rise through the water and pass with the steam from the main boiler to the engine.

The inventor thinks that the most economical use of this generator would be to employ two engines, one condensing and the other non-condensing, and not allowing the products of combustion to mingle with the pure steam but to use the latter in the condensing engine expansively and the former in the non-condensing engine to be exhausted into the atmosphere. In using large boilers he suggests the employment of a small engine to force the air into the furnace when the main engine is stopped.

We can see no reason why this principle may not be economically applied, although, perhaps, improvements may be made on the device here lit presented.

A patent for this improvement were procured through the Scientific American Patent Agency Sept. 26, 1865. For further information address George Sill, Wilkins, Alleghany county, Pa.

Fig. 1.

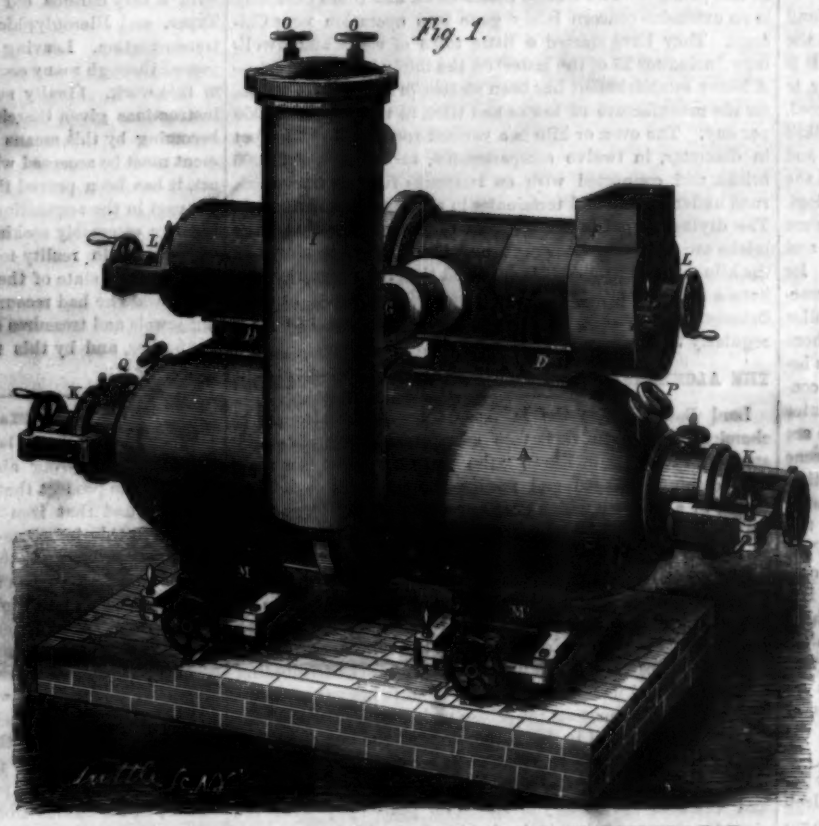
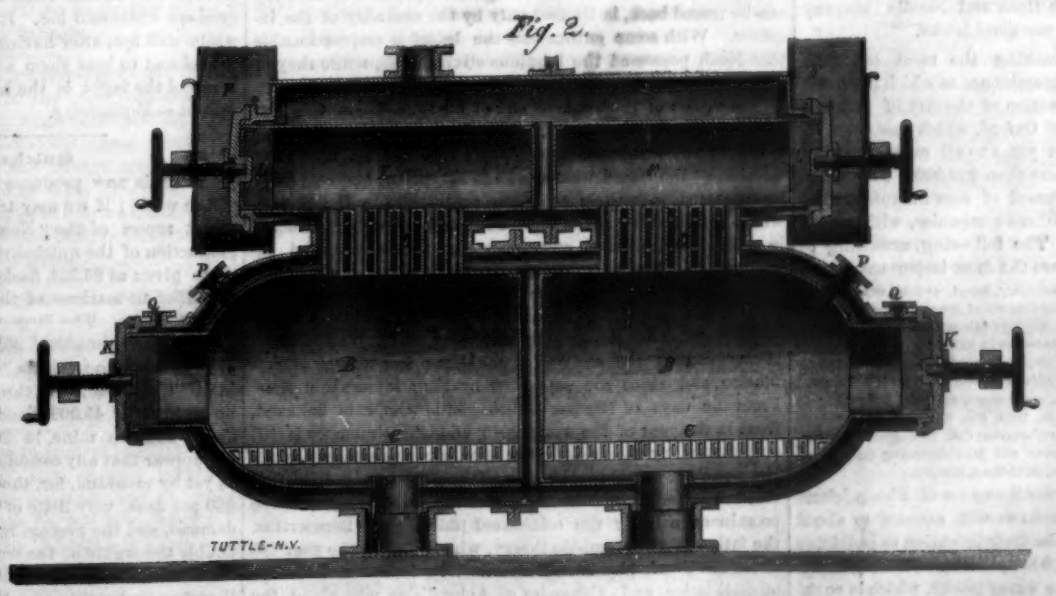


Fig. 3.

SILL'S AIR-TIGHT STEAM GENERATOR.

Fig. 2.



Locomotive Engineer Strike in England.

Great excitement prevailed in England at our last advices in relation to the general notification from the locomotive engineers and firemen that they would leave their work at a date specified unless the following demands were conceded: Ten hours, or 150 miles run, to constitute a day's work: wages of drivers to be for the first six months 6s. per day, for the second six months, 6s. 6d., and thereafter 7s. 6d. (7s. in the country); firemen to rate, as above, at 3s. 6d., 4s., and 4s. 6d. (country firemen 4s. 6d. after 3 years service): firemen to be promoted to drivers exclusively according to seniority in service, thus ignoring merit of every kind; and Sunday work to be paid one price and a half. The proportions of wages and principle of promotion demanded both indicate a desire to establish a uniform standard of wages and as nearly as possible an agrarian equality.

SCIENCE AS THE LATEST PARISIAN FASHION.

The Emperor and Empress of France and the whole imperial court are now setting a good example, which will be followed by all Paris, and eventually by all the fashionable world, namely to take an interest in scientific lectures and experiments. Hitherto science had only been popularised, but not made fashionable, and any move to interest the self-styled "cream of society" in it, and prove to them that there is more enjoyment in natural philosophy, chemistry ,etc., than in balls, parties, etc., is a move in the right direction, because of the necessary influence exerted on society by the wealthy. To give our readers an idea of what is going on in this respect in Paris, we subjoin an abbreviated translation of an accoun found in one of the latest Parisian journals, about the doings of the French court:—

"It is nine o'clock P. M. There is no reception, ball, or any other brilliant party at the palace of the Tuileries; the Emperor has beside his court only a limited number of guests. The passers by, looking at the dark edifice, wonder what is going on now. Well, the imperial court attends the scientific lectures. A few evenings ago M. Leverrier lectured on astronomy; to-night M. Moigno lectures on electricity. During day batteries, coils, electric and magnetic machines were brought to the palace; the guards looked with surprise at them, but science is penetrating everywhere. In the yard Mr. Duboscq had arranged a battery of fifty Bunsen's elements, of which the wires were attached to the machines placed in the *salle du trone*. The usual lights were extinguished, and only the electric lamp shone brightly. M. Moigno, surrounded by an illustrious staff of all the celebrated electricians of Paris, threw a ray of light on a screen, and after some general explanations, decomposed it into the colors of the rainbow, and then made to appear in these rays the peculiar lines lately discovered by Bunsen, produced by the combustion of different metals: the three green lines of copper, the two brilliant green lines of silver, the red and violet lines of zinc, etc.

"Then the most powerful electric machine in the world, constructed by Keppel, was put in operation. In a few turns of the disk the enormous brass globes serving as conductors were charged, and torrents of flashes of lightning went zigzag through the air to a distance of more than two feet.

"The new electric machine of Holz, perfected by Bertsch, was put in operation by the last named. The attention of the Emperor was strongly attracted by this instrument; he came nearer to speak to the inventor; the young prince followed him, and soon the whole court was mixed with the operaters, somewhat frightening the Empress when her little son handled the coils and Leyden jars, and received an unexpected shock. [Served him right.]

"Mr. Achard then explained the action of his electric warning signal for railroads, one of the best among the two thousand thus far invented. Mr. Poitevin put his electro-magnetic motor in operation. The Geissler's tubes were exhibited, which become luminous by electric currents, and exhibit different colors, according to the chemical composition of the glass and the rarefied vapors contained in them. The name of Napoleon III. appeared in this way in streaks of colored fire and by turning a disk to which a set of such tubes was attached, a most beautiful pyrotechnic sun was obtained, called the star of Gassiot. After some other experiments, the ladies of the court desired to take the shock; they joined hands, formed a circle, and half crying and half laughing, they bravely took the discharge of some minor electric apparatus."

BUSINESS AND MANUFACTURING ITEMS.

WOOL.—The largest woolen mill in the country is slowly approaching completion, in Woonsocket, R. I., for E. Harris, the manufacturer of a leading quality of cassimeres, etc. It will contain 35 sets of machinery. Not more than half the existing woolen machinery in the state is now running.——A new five story stone mill, 140 feet long, has recently been erected for the Mohawk Woolen Mills Company at Little Falls, N. Y ——The Andover (N. Y.) Woolen Mill will begin operations about the first of April with an investment of about $40,000. ——A new woolen mill is building at Lawrence, Kansas.—— A woolen mill is about to be erected at Locke's Mills, Greenwood, Me.——Woolen companies have been lately started at Flint, Mich., and at Kent, Ohio.——There are six woolen mills in Oregon, and another soon to be built in Rogue River Valley.

COTTON.—The Hamlet Mills, Woonsocket, R. I., are about to add 7,000 spindles and 130 looms to their present establishment for fine cottons.——The Social Manufacturing Company has recently doubled its capacity, now running 40,000 spindles and 800 looms, on sheetings and silesias.——The new Durfee printing cloth mill at Fall River, just started, contains 40,320 spindles and 960 looms, employing 600 hands and producing 36,000 yards daily.——It is announced that there are now thirteen cotton factories in operation in Tennessee.

IRON.—The black band iron ore of Pennsylvania, not long ago discovered, is alleged to be much richer in iron than the Welsh black band, and three times as thick in the vein. It is a union of coal and iron, containing enough of the former to reduce the latter with the aid of a small amount of other coal. "Why," says the Pottsville *Standard*, "should not Schuylkill county blaze with long lines of furnaces and rolling mills and workshops of every description? Why should it not rival the population, the industry and the wealth of the same geological belts in England, Scotland and Wales? In Wales this ore had for many years been thrown away as earthy slates, and large piles of it had accumulated around the mine pits. Its ferruginous qualities were finally detected, and almost immediately furnaces sprung up in long lines for miles and miles through the coal field where the black band existed. There is one little narrow basin in South Wales which produces between 25,000 and 30,000 tuns of pig metal per week, and consumes more coal than all the iron works in the United States combined. In that small patch it is no unusual thing to see fifteen and twenty furnaces side by side, and the whole scene for over twenty miles includes nothing but furnaces, roasting kilns, rolling mills, coal and iron mines, and the usual clamor of machinery and of bituminous fires from thousands of tall chimneys."——The coal deposits of Illinois, according to Prof. Waterhouse, exceed those of Great Britain. The Chester coal bed is located in Randolph, Jackson and Perry counties, Illinois. Eighteen thousand acres have been tested, and three strata of coal found: the first 36 feet deep and 6 feet thick, the second 77 feet deep and 4½ feet thick, the third 119 feet deep and 6 feet thick. The quantity of coal in the area already examined is, according to the common methods of measurement, 450,000,000 tuns. The pure quality of the Chester coal makes it the best in this country, if not in the world, for the manufacture of pure iron. It has less than one per cent of sulphur and is comparatively free from bitumen. Iron manufacturers assert that it makes a better and stronger metal than the Scotch pig. The coal field lies only twelve miles from the Mississippi river, fifty from the iron mountains of Missouri, and seventy-two from St. Louis by river. A railroad from Chester to the mines is now contemplated, to connect with the St. Louis and Cairo railway, which has been already surveyed. It will be twelve miles long and cost $300,000. These conditions, it is expected, will lead to the erection in the vicinity of St. Louis of the largest iron works in the United States.——180,000,000 fish hooks are turned out every year by the American Fish Hook and Needle Company at New Haven: mainly cod and mackerel hooks.

MISCELLANEOUS.—Maine is making the most energetic strides toward the manufacturing eminence to which her great water power entitles her. The action of the city of Augusta has been imitated by the town of Oxford, which has voted an exemption from taxation for ten years to all manufacturing capital introduced in lots not less than $10,000. The legislature has legitimated a large brood of new manufacturing enterprises, not less than thirty-three companies, with an aggregate capital of $13,160,000. The following, according to the Boston *Commercial Bulletin*, are the most important.

Saco Water Power Machine shop, machinery, wood, cotton, woolen, etc., capital $300,000; Newport Manufacturing Co., wood, iron, wool, cotton, etc., $300,000; Casco Paper Co., at Yarmouth, $50,000; Hinckley Knitting-Machine Co., Biddeford, $100,000, with power to increase to $500,000; Lockwood Mills Co., Lewiston, cotton, wool, and flax, $2,000,000; Madawaska Mills Co., Lewiston, cotton, wool, and flax, $1,000,000; Hollis Manufacturing Co., Hollis, wool and cotton, $200,000; Portland Stone Co., stone ware, $100,000; Androscoggin Water Power Co., Lisbon, wool, cotton, iron, etc, $500,000; Muzzy Iron Works, Bangor, $150,000; Monson Manufacturing Co., Kennebunk, cotton wool, etc., $100,000; Ticonic Water Power and Manufacturing Co., Waterville, $3,000,000; No Plus Ultra Collar Co., Biddeford, $100,000.

The proposed investment by the Spragues of Rhode Island in the Augusta water-power purchase will amount to about $8,000,000. It is understood to be their intention to build five mills, with an aggregate of 500,000 spindles. These will demand only about one third of the water power, which is equal to carrying 1,200,000 spindles in the dryest season ——Another form of wooden solid shoes has been patented and is now made by a manufacturer in Maine. A cushion of curled hair is fixed upon the inner side of the sole, and the bottom is covered with gutta-percha cement, upon which is applied a perforated plate of malleable cast iron, to give the wearing surface. The welts are cemented to the sole.——A new paper mill on a large scale is to be built at Jewett City, Conn., by the Reade Paper Company.——The New York Watch Company, who own the patent of the Mozart escapement, propose to locate their works in Springfield, Mass., if $150,000 of the $500,000 capital should be subscribed there. The machinery is building at Providence.——The cheese factories of the state of New York already number more than 500, using the milk of over 200,000 cows. Cheese factories are multiplying in Vermont. ——The water power obtained by the construction of immense dams across the Licking and Muskingum rivers, at Zanesville, Ohio, now runs five flouring mills, three foundery and machine shops, two founderies, the Ohio Iron Works Company's rolling mill, three glass factories, two paper mills, one cotton and two woolen factories, one last factory, seven breweries, six tanneries, one sash and blind factory, and a number of other establishments——The lumber marketed from the mills on St. Anthony's Falls, at St. Anthony and Minneapolis, the last year, amounted to 77½ million feet, 34½ million shingles, 18 million laths, and minor items. The product of the flour mills was worth $1,661,500; lumber, $1,855,000; woolen mills, $174,000; machine shops, $211,450; paper mill, $100,000; cooperage, $106,000; planing, sash and door mills, $84,200; furniture, $96,000; pails, etc., $60,000— total, $4,348,150. The manufacturing investments amount to a capital of $1,651,000. This business is the growth of less than ten years, and constitutes barely a beginning in the utilization of the almost matchless water power of the Mississippi at this point.——The United States Clock and Brass Company is an extensive concern lately gone into operation near Chicago. They have started a little town of shops and dwellings (including 25 of the latter) on the lately bare prairie.—— A heavy establishment has been started in Jefferson City, La., for the manufacture of bricks and tiles, at the rate of 20,000 per day. The oven or kiln is a vaulted round house 150 feet in diameter, in twelve compartments, each holding 20,000 bricks, and connected with an immense furnace flue which runs under ground and terminates in a chimney 100 feet high. The drying tunnel is heated from the same source, and the bricks are run in and through, and thence to their places in the kiln, on a railway. It is expected that this enterprise will have a material effect upon building and real estate in New Orleans.——Fowler & Co.'s English steam plow has gone regularly to work on Louisiana plantations.

THE ALCHEMISTS AND THE ART OF TRANSMUTATION.

Lord Bacon likens the labors of these early pioneers of chemical science in their vain search for the philosopher's stone or the elixir of life to "the young men of the fable who carefully digged and re-digged their father's field in search of a treasure which they never found, but whose labor was amply repaid by the fertility of the soil which they turned up with other intentions." It is curious to mark the diversity of opinions to which, after careful investigations, different authorities have arrived respecting the value of these early researches: while Harris and his class indiscriminately condemn the whole practice, by the concise and sarcastic definition of alchemy as "an art without art, originating in falsehood and proceeding through labor to beggary," others again, though lamenting the selfish ends which furnished the motive, are bountiful in their laudations of the benefits accruing to mankind as the result of their labors. Dufresnoy, one of the best authorities on this subject, takes a middle stand and prefaces his history of Hermetic philosophy with the singular statement that he is about to favor his readers with the history of the greatest folly and the greatest wisdom of which man can be capable, immediately after explaining this paradox by enquiring whether "there is anything more insane than the wish to change the inherent nature of created things, or anything wiser than the desire to be prosperous and possess health and riches," adding "such are the men of whom I speak and among them are to be found many foolish and but very few wise men."

The time to which the knowledge and practice of alchemy can be traced back, is limited only by the credulity of the inquirer. With some enthusiasts the belief is unquestionable that Noah possessed the fabulous elixir of life, while they as persistently claim the modern word chemistry as but a natural corruption of the name of one of his sons, Cham the first king of Egypt. However originated, certain it is that in the remotest times rudimentary chemistry formed an important element of the famed wisdom of the Egyptians and was early incorporated into their religious ceremonies by the priests, whose experiments in the so-called sacred art were conducted in the strictest privacy, any revelation to the uninitiated being punished by death. While Egypt retained her national supremacy, rapid advancement in the holy art was impossible, but when the state lost its independence the field and facilities for study became greatly extended. The history of alchemy during the early ages mentions few writers of reputation, and these are separated by long intervals of time. From the days of Hermes Trismegistus who, it is believed, lived in the year of the world 2076, and whose memory is still perpetuated by the designation often given to alchemy as the Hermetic art, down to the second century of the Christian era, the list of distinguished proficients embraces but three prominent names; the celebrated philosopher Democritus, the father of the atomistic theory, who lived in the year 460 B C., the Greek physician Discorides, the inventor of the art of distillation, and Alexander of Aphrodisias who about the same time described the distilling of sea-water and of wine.

Unrivalled among the alchemists of the middle ages stands the learned but pedantic Prince Geber. The numerous works of this author are replete with the most abstruse sentences, so that Dr. Johnson in his dictionary claims that the derivation of our word gibberish, signifying whatever is outlandish and unintelligible, arises from the name of this philosopher because of the profuseness of involved expressions in all of his writings. These works contain the germs of the belief in the transmutation of metals and in the universal elixir, which he believed to be a solution of gold. They contain also useful details concerning the nature, fusion, purification and malleability of metals and describe the properties of nitric and sulphuric acids, aqua regia, alcohol and the preparations of mercury and metallic salts. Geber, like those preceding him, believed that the metals were compound in their nature, consisting of mercury and sulphur with a third element, arsenic, which in its varying proportions gave to the metal its characteristic form.

Four hundred years after the death of Prince Geber, appeared nearly cotemporaneously the celebrated scholar Albertus Magnus, remarkable for his learning and especially his knowledge of physics; Raymond Lully, who as keeper of the mint under King Edward applied his rare knowledge of the metals to the benefit of his government; and Roger Bacon, the discoverer of gunpowder and of the use of concave and convex lenses, and the most eminent of English natural philosophers previous to the era of his namesake. These men were each siezed with the popular delusion of transmutation and by their writings raised the study of alchemy to a degree of credit that it little deserved.

Passing to the fourteenth century the first name preserved for us as a successful alchemist is that of Nicholas Flammel. The story of this man's life records his accidental meeting with a very curious old book which concealed under "Vails, Types, and Hieroglyphic Covertures" the wonderful art of transmutation. Leaving his legitimate calling of a scribe he passed through many countries before procuring a translation of this work. Finally successful, he minutely followed the instructions given therein, meeting with perfect success and becoming by this means immensely rich. This latter statement must be accepted with reserve for, unfortunately for the art, it has been proved that alchemy played a very unimportant part in the acquisition of this wealth, as the various journeyings ostensibly seeking an interpretation of hidden mysteries were in reality for the collection of debts, and while the unsettled state of the country at that time made travelling unsafe he had recourse to this artifice for safely transporting jewels and treasures entrusted to him from one country to another, and by this means amassed a considerable fortune.

What Makes Iron Fibrous.

When Mr. Bessemer began to manufacture wrought iron from cast, by blowing air into the molten metal, it was objected to the product that it had no fiber, as common puddled iron had, and that iron without fiber must necessarily be weak. In this inference—which was wholly theoretical—we did not concur, and the question then arose, what does fibrous iron really mean? When the particles of wrought iron are brought to a high temperature, without the presence of any intervening material, they cohere in every direction, and the iron is not fibrous. But when slag is intermingled, as in common puddled iron is the case, there are intervening layers of cinder, which, when the iron is passed through the rolls, are not wholly expelled, but are only greatly attenuated; and as these planes are then very numerous, and pass in every longitudinal direction, they prevent to some extent the lateral adhesion of the particles, which, however, adhere end to end, and a fibrous iron is thus produced. It is now well known that homogeneous iron is much stronger than fibrous iron. But at the beginning of the manufacture, fiber was accounted as necessary in iron as in ropes or thread—a theory resulting merely from the accident of the production of fiber by the modes of manufacture then exclusively employed. In the case of iron produced by the common process, any bubble or vacuity in the metal becomes filled with slag, which hinders the sides from being effectually welded under the hammer. But in the Bessemer iron, as the slag is absent, the sides of the bubble cohere when the ingot is subjected to pressure while still hot. It is better to hammer the ingots while still hot, after having been poured, than to allow them to cool and to heat them afterwards. For in the one case the heart of the ingot is the hottest part, and in the other the coldest.—*Engineering.*

Quicksilver Mining.

California now produces more quicksilver than all the rest of the world; if we may trust the statistics embodied in the recent report of the "New Almaden" company. The total production of the quicksilver mines of the world for 1866 is there given as 85,534 flasks, and the accumulated supply in the different markets of the world, is estimated to be about 120,000 flasks. The largest contributor to the total for 1866 is the "New Almaden," 35,150; next the Almaden, in Spain, 32,400; then the "Idria" in Austria, 7,225, and the "New Idria" Cal., 6,045, with three smaller California mines, making up a total of 45,909 flasks American, 39,625 foreign. The Santa Barbara mine, in Peru, is nearly abandoned. It does not appear that any considerable part of this increase is wanted as yet by mankind, for, though serving to lower the price to $30 per flask, very little of it has been absorbed by increased demand, and the present rate of supply is said to be at least double the wants of the world. The direct cost of producing the New Almaden article is about $16 15 per flask. There is therefore probability of a further great reduction in the price, which may possibly bring the increasing supply into more extended uses.

THE AFRICAN TELEGRAPH.—The natives in the "Camaroons'" country on the west coast of Africa, use an instrument which they call "Elliembic," upon which they produce a variety of sounds, audible at several miles distance, and arranged so as to form a perfect and distinct language, in which they send their "telegrams" from point to point. The instrument has been in use from immemorial time.

Editorial Summary.

ABOUT FOOD.—An English physician (Dr. Thudichum) asserts that Liebig's extract of meat lacks the essential properties of nutriment. It contains the elements required in very small proportion and in an oxydized state, and is simply a stimulant, a strong beef tea, when prepared for swallowing. Of the 25 per cent solid substance contained in meat, four fifths are insoluble in water or become so by boiling, allowing only one fifth of the solid parts, or five per cent of the whole, to be saved in the extract. He thinks that after eggs, the nearest substitute for meat is Indian corn and other kinds of seeds, beans, peas, etc., when grown in southern climates. Northern grown beans are not approved, and this kind of food always requires peculiarly careful preparation to be digestible. Vegetable food requires much digestion, and its use demands and creates an increase of the stomach, which is visible in well-fed vegetarians, and in the lengthening of the intestine of the domestic cat from the proportions of the wild state, in consequence of changing its diet from flesh exclusively to bread and potatoes.

IMITATIONS OF GOLD.—Oreide, the beautiful alloy resembling gold, manufactured in Waterbury, Conn., is a French discovery, and consists of pure copper 100 parts; zinc, or (preferably) tin, 17 parts; magnesia, 6 parts; sal ammoniac, 3.6 parts; quicklime, 1.8 parts; tartar of commerce, 9 parts. The copper is first melted, then the magnesia, sal ammoniac, lime, and tartar in powder, are added little by little, briskly stirring for about half an hour, so as to mix thoroughly; after which zinc is thrown on the surface in small grains, stirring it until entirely fused; the crucible is then covered, and the fusion maintained for about thirty-five minutes, when the dross is skimmed off, and the alloy is ready for use. It can be cast, rolled, drawn, stamped, chased, beaten into a powder or leaves, and none but excellent judges can distinguish it from gold. Another beautiful alloy rivalling the color of gold, is obtained with 90 per cent copper and ten per cent aluminium, which must be perfectly pure, of the best quality, and in exact proportion. It is little affected by the atmosphere, and is strong, malleable, and homogeneous in structure.

THE MORTALITY OF BACHELORS.—Dr. Stark of the Scottish Register Office, has compared the vital statistics of married and unmarried men, and announces that the mean age of the married at death is 60·2 years, while that of the bachelors is only 47·7—excluding those who die before 25 in both classes. We don't wish to set *everybody* against the poor bachelors, but this point seems to demand the attention of life-insurance companies—if indeed bachelors ever imagine their lives worth enough to anybody to deserve insuring. We did not know that to the command "increase and multiply" was tacitly attached the promise "that thy days may be long in the land" etc.; but it seems, so far, that if bachelors wish to recover an average of twelve and a half years of life, or such part thereof as may not be already irretrievably forfeited, they should make haste to be married Celibacy appears to be one of Nature's capital offences.

THE BROADWAY BRIDGE.—Our engraving and description of this convenient and handsome structure have attracted much attention abroad. The London papers strongly urge upon the city government the construction of similar bridges at crowded points in that metropolis. It is now understood (says *Engineering*) that the experiment of an over-street bridge for foot passengers is to be made in London, near Hyde Park corner. About 200 persons, it is added, are yearly killed outright, and upwards of 2,000 are more or less injured, by being knocked down by vehicles in and near London. The plan of bridging streets is open to many doubts, which are pointed out by our English contemporary, and we should suppose the London authorities would prefer to await the result of our experiment before proceeding to build.

FROZEN FRUIT TREES.—A correspondent of the *Prairie Farmer* gives an experience to the effect that shaking apple trees when frozen by untimely frost, destroyed the trees. Six trees thus gathered, never leaved out again, while others of the same varieties that were not shaken received no injury. This effect of vibration—if that were all—upon the frozen veins of the tree, is conceivable, but extraordinary. Violent winds at a similar juncture would destroy the whole stock of apple and many other kinds of trees.

SAFETY LAW FOR PUBLIC ASSEMBLIES.—The Legislature of Pennsylvania has passed a law requiring all doors of egress to be kept fastened open during any public assembly, unless they are hung so as to open outward, and prohibiting the obstruction of the passages in any manner, as by benches, chairs, etc.

TREE-PLANTING has begun in earnest in different parts of the country. It will probably soon become general, except in localities where tree-saving is not too late as a substitute. In Minnesota, says the *Prairie Farmer*, tree-planting was all the rage last fall. A farmer in California is about to plant a hundred acres with locust trees.

HYDROPHOBIA.—Crystals of nitrate of silver rubbed into the wound, are prescribed by Youatt, who has been bitten eight or ten times by rabid animals. It is a disease to which the susceptibility of individuals seems to vary so remarkably that no remedy has yet been found generally applicable.

EXTREMELY HARD CAST IRON has been made by M. Gaudin by introducing a small quantity of boron, and lately, by combining the fused iron with phosphate of iron and peroxide of manganese.

VITRIFYING SURFACES.—Experiments are making under the direction of the French Government, with a view to the production of vitrified armor plates and iron hulls. The method employed is that of M. Balloutrey, who places the surface in contact with the elements by which white glass is produced, and heats it to the point of vitrification. The surface iron unites with the silicic acid and participates in the resulting silicate,) producing the toughest description of glass in a state of inseparable contact with the plate. To prevent the destruction of the coating, even if thin, by the vibration of the iron from mechanical shocks or changes of temperature, is the point of difficulty.

A new method of enameling pottery has been patented by M. Clemandot, director of the Crystal Glass Manufactory of Clichy, near Paris. The soluble alkaline silicates form a hard combination with clay, by the aid of heat. The article of clay, after being wholly or partially baked, is either steeped in or coated with a solution of the silicate until its surface is saturated, and then heated to fusion of the silicate, which then combines with the pottery. The common but objectionable use of lead is thus dispensed with.

DRAINAGE.—The Metropolitan Sanitary Commission of London compute that for every inch depth of water drained off, and which would otherwise pass into the air as vapor, as much heat is saved per acre as would raise eleven thousand cubic feet of air one degree in temperature. A farmer was asked the effect of some new draining, when he replied, "All that I know is that before it was done I could never get out at night without an overcoat, but now I never put one on." A physician took one of the Sanitary Commissioners to a hill overlooking his district. "There," said he, "wherever you see those patches of white mist I have frequent illness, and if there is a cess-pool, or other nuisance as well, I can reckon on typhus every now and then. Outside these mists I am rarely wanted."

THE SPIROMETER—measuring the actual bulk of respired air in any individual pair of lungs—has shown that this measure, as might be supposed, is a very good general index of the state of health and vigor in all respects, even when the variation is not very perceptible in other ways. A medical reviewer in a late publication testifies that "in examining for insurance persons apparently robust, we have found that none of those who habitually drink spirits between meals, even in such moderation as to be considered strictly temperate, can blow up the spirometer to their due figure. And in several instances of really intemperate persons, this mode of observation has led to the detection of their secret.

A CONVENIENT TABLE.—The following statement is given by an exchange as a guide for estimating the quantity and cost of nails for a given definite piece of work:—

2-penny	1	inch	557 nails per lb.
3-penny	1¼	inches	378 nails "
4-penny	1½	inches	232 nails "
5-penny	1¾	inches	167 nails "
6-penny	2	inches	147 nails "
7-penny	2¼	inche	141 nails "
8-penny	2½	inches	101 nails "
10-penny	2¾	inches	68 nails "
12-penny	3	inches	54 nails "
20-penny	3½	inches	34 nails "
Spikes	4	inches	16 nails "
Spikes	4½	inches	12 nails "
Spikes	5	inches	10 nails "
Spikes	6	inches	7 nails "
Spikes	7	inches	5 nails "

FRENCH IMPROVEMENTS.—An American telegrapher writes: "Your issue of March 30th contains a notice of 'Telegraph Lightning Protectors' just invented in France. This announcement reads strangely to one who has used the lightning protectors (or as known among telegraphers, lightning arresters) for five or six years. The French may excel us in some of the arts but it is doubtful if they excel in telegraphing. They should visit Yankeedom and examine the telegraphs, then take a jump ahead five or six years instead of inventing instruments which have gone out of use here."

A FREAK OF WEATHER.—A correspondent travelling in the Red river country, Louisiana, writes that the country is all overflowed again, and that after three weeks summer weather, thermometer at 90°, crops all planted, corn growing, and trees in bloom, on the 12th of March the mercury fell from 90° to 28° between 9 A. M. and 5 P. M. The wind blew furiously all night, depositing a crust of frozen sleet two inches thick, on the top of which the snow fell ancle deep. Of course the agricultural labor and the promise of the fruit trees were wholly lost.

STEAM PLOWING IN ENGLAND.—The Steam Cultivation Commission appointed by the Royal Agricultural Society, find that some 400 steam cultivators are at work on 230,000 acres of arable land, displacing 2500 horses. The machine eats only when working, and thus saves in that item at least $500 a year to its employer, while doing its work deeper and more thoroughly and rapidly than it can be done by animals.

EXPLANATION.—"Civil Engineer" requests us to explain that in his plan for constructing sub-aqueous tunnels, the chambers between the double walls of the coffer dam—not its main interior—were to be employed for getting access to the bottom and excavating a bed for the dam.

AN AUTOMATIC SCALE FAUCET has been introduced, which measures the liquid drawn with perfect accuracy as it runs out, cutting it off at the required point. Barston & Childs who now manufacture the article at Utica, are making arrangements to start a branch factory in New England.

THE POINT OF ABSOLUTE COLD, or deprivation of all heat, is estimated to be about 275° below zero, centigrade, equal to 463° below zero, Fah. The centigrade degree is equal to 1.8 of the Fah. and its zero is the freezing point of water, or 32 Fah. degrees above the Fah. zero, which is therefore —17 $\frac{7}{9}$ centigrade.

SUGAR REFINING IN SCOTLAND.—At a festival held by the employees of a Greenock firm, a few weeks since, M. Niccol, the author of a well known treatise on sugar refining, boasted that Greenock refined sugars had the preference at the same price, among the London grocers and their customers, over those of London; while the former undersold the latter, even when the raw sugars had been bought in London, carried to Greenock, refined there, and returned to the London market. The working capacity of the Greenock refineries had been more than tripled in the last nineteen years mainly by improvements in construction and processes. The speech is fully reported in *The Grocer* (London) without remark.

LARGE WOOD-SCREW BOLTS for securing armor plates are forged in France by an unknown process which has exercised the conjectures of the Sheffield men not a little. *Engineering* suggests that such bolts may be rolled between plates grooved in a proper manner. Others think the screw is forged in a machine, with a shaped trip hammer. One or the other process would seem to be a practicable and valuable improvement worthy the attention of our ingenious machinists.

THE AMERICAN NATURALIST.—Not a few of our readers, we are persuaded, will learn with pleasure that a handsomely printed monthly under the above title is to be issued by the Essex Institute, Salem, Mass., designed to "popularize the best results of scientific study" in the department of natural history.

ARGENTIFEROUS LEAD ORE is deprived of its silver by M. Cordure, by adding a small quantity of zinc to the fused ore. The zinc forms an alloy with the silver, lighter than the lead, and thus brings it to the surface, where it cools and may be removed, remelted and separated.

GLEANINGS FROM THE POLYTECHNIC ASSOCIATION.

The regular meeting of this branch of the American Institute, was held on Thursday evening, March 28th, Prof. Tillman presiding.

At the meeting of the Polytechnic Association, March 28th., Dr. Rowell explained a theory of the regular migration of icebergs from the supposed polar sea to the Atlantic. The line of glacier-bearing coast is supposed to be from 6000 to 10,000 miles in extent. The glacier is assumed to increase and descend upon the coast from constant or periodical causes until its projecting mass over-lapping the water becomes detached by its own gravity, at about the same time at all points. The submersion of this inconceivable mass would raise the level of the polar sea and cause a tremendous eruption of its waters into and through Baffin's bay, clearing the channels of fixed and floating ice, and carrying out to sea the majestic fleet of icebergs which explorers have so often counted to the number of five hundred at a time. The regular current setting in through Behring's strait resisting the swell in that direction, and the correspondent outward current with the wider outlet through Baffin's bay assisting it, the icebergs necessarily drift out through that channel and not the other.

Fruit Essences.

Dingler's Polytechnic Journal gives the following table of the composition of artificial fruit essences, showing the number of parts of each ingredient to be added to 100 parts of alcohol—all chemically pure. Glycerine is found in all—it appears to blend the different odors, and to harmonize them:—

	Peach.	Apricot.	Plum.	Cherry.	Black Cherry.	Lemon.	Pear.	Orange.	Apple.	Grape.	Gooseberry.	Raspberry.	Strawberry	Melon.	Pineapple.
Glycerine	5	4	3	3	..	5	10	10	4	10	..	4	3	3	3
Chloroform	..	1	..	..	..	1	..	2	1	3	..	..	..	..	1
Nitric Ether	..	..	..	..	..	1	..	..	1	..	..	1	1	..	..
Aldehyde	2	..	2	..	..	..	..	2	2	2	1	1	..	2	1
Acetate of Ethyl	5	..	5	5	10	10	5	5	1	..	5	5	5	..	..
Formiate of Ethyl	5	1	..	..	..	..	1	..	2	..	..	1	1	1	..
Butyrate of Ethyl	5	10	2	..	..	..	1	..	..	..	1	2	4	5	..
Valerianate of Ethyl	5	5	..	..	..	..	..	..	..	..	..	..	5	..	..
Benzoate of Ethyl	..	..	5	5	..	..	1	..	..	..	1	1	..	..	..
Œnanthylate of Ethyl	5	1	4	1	2	..	..	..	10	1	1	..	..	..	..
Sebacic Ether	1	..	..	..	..	..	..	..	..	..	1	..	..	10	..
Salicylate of Methyl	2	2	..	..	..	..	1	..	1	..	1	1	..	..	..
Acetate of Amyl	..	..	..	..	..	10	10	..	..	..	1	5	..	..	..
Butyrate of Amyl	..	1	..	..	..	..	..	..	..	..	1	2	..	10	..
Valerianate of Amyl	..	..	..	..	..	10	..	10	..	..	..	..	..	..	..
Essence of Orange	..	..	..	..	..	..	10	..	..	..	..	..	..	..	..
Alcoholic solutions saturated in the cold of	Tartaric Acid	..	..	..	..	10	..	1	..	5	5	5	..	..	..
	Oxalic Acid	..	1	..	..	1	..	..	..	..	..	..	..	..	..
	Succinic Acid	..	..	..	..	1	..	..	1	1	1	..	..	..	..
	Benzoic Acid	..	..	1	2	..	..	..	..	1	..	..	..	..	..

How to Save the Rain.

The waste of the rainfall in a small and crowded territory like England, is becoming a serious matter as towns enlarge and multiply and begin to clutch at the limited sources of pure water supply. At the rate of progress in the past, the attainment of wholesome water for London and all the other great towns, now so expensive and difficult, will in time become impossible. To give the population of London 50 gallons of water per head per day, would require the mean rainfall of 70,000 acres, if every drop were saved. The project put forth by an English engineer, to collect rain for the metropolis on glass roofs (beneath which winter gardens might be carried on) would require glass making on a rather large scale. Not to destroy the land, at least half the rainfall must be given up to irrigation, so that 140,000 acres of glass roofing would be the smallest allowable estimate. Probably the plan is designed only to supply pure water for drinking and culinary purposes, leaving the Thames to meet the coarser wants. The 4,000 acres which it is proposed to roof with glass would give nearly a gallon and a half of water per day to each of the inhabitants of the metropolis. This would require nearly 175,000,000 square feet of glass, costing from fifteen to twenty millions of dollars and a much larger sum for the framework, besides reservoirs, conduits, etc. The calculation shows how hard it may one day become to meet the wants of increasing population.

ELECTRIC LIGHT.—WILDE'S MAGNETO-ELECTRIC MACHINE.

The subject of electric light is now attracting more attention than at any former period. Every day we find something about it in our foreign and domestic exchanges. Three of the city newspapers within a few weeks have printed full column editorials under the title of Electric Light. The light-house directors of England, France and America simultaneously but independently are instituting experiments on a liberal scale to determine if the electric light may not be the best for light houses. And as a natural consequence of these movements a business association under the style, "The American Electric Light Company" has been chartered, and will be soon in active operation.

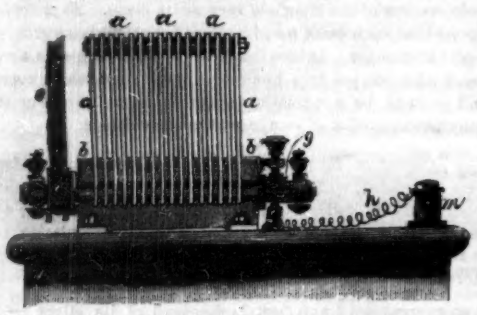


Fig. 1.

This new interest in electric light was originated by the exhibition in England of the machine which is described in this article. No wonder, for the light from it is the most powerful artificial light ever produced. Mr. Crookes testifies that when he saw it, it had three or four times the power of the sun-light. The machines first built were found too powerful for light-house illumination, and it was found advisable to make machines for that purpose of only one-half the original sizes. So much light also implies that the Wilde machines are the most powerful electric apparatus ever constructed.

The first impression that our engravings will give to those who are familiar only with the ordinary magneto-electric machines, is that Wilde's machine is more complicated and depends upon different principles. But the fact is that the arrangement is very compact and simple, and no principle is involved which is not understood by all electricians. Wilde's machine may be considered a compound magneto-electric machine; a magneto electric machine having permanent magnets furnishing an electric current to excite the magnets of a second magneto-electric machine which differs from the first in being larger and in having electro magnets instead of permanent magnets; this second machine may drive a third, and so on, each additional machine greatly increasing the power of the final electrical current. Thus with the smallest magneto-electric machine with permanent magnets as the original source, the final current may have any desired power.

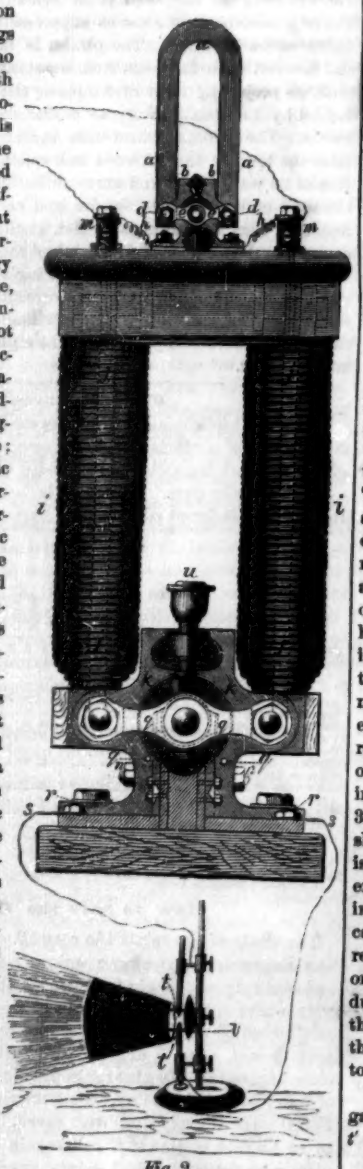


Fig. 2.

Fig. 1 represents a side view, and Fig. 2 an end view of the machine, the letters referring to the same parts in each. *a a a a* are 16 permanent magnets, bolted on to the magnet cylinder *b*, shown in magnified section at Fig. 3. The magnets weigh about 8 lbs. each, and will support a weight of about 20 lbs. In the magnet cylinder the part *b b* is iron and *c c* brass, and it is so arranged that *b b*, being screwed on to the respective poles of the magnets at *d*, form one entire north pole and one entire south pole to the 16 magnets, separated from each other by the brass pieces *c*. A circular hole, 2½ inches in diameter is bored lengthwise through the metals, so as to form them into a hollow cylinder of brass and iron. Fig. 4 represents the armature, a transverse section of which is also shown in its place inside the hollow cylinder, Fig. 3. It consists of a cylinder of cast iron, about one-twentieth of an inch less in diameter than the hole in the cylinder *b c b c*, so that it may revolve in very close proximity to the interior of the hollow cylinder without touching it, being held at each end by appropriate brass supports, in which the axis of the cylinder works. At one end of the armature is a cylindrical prolongation *d*, on which a pulley *e* works, and at the other end is fixed a commutator. About fifty feet of insulated copper wire, one-eighth of an inch in diameter, are wound upon the armature in the direction of its length, as shown in Fig. 4, and in section in Fig. 3. The inner extremity of the wire is fixed in good metallic contact with the armature, the other end being connected with the insulated half of the commutator. Bands of sheet brass, *f f*, are bound at intervals around the armature, in grooves sunk in it for that purpose, their object being to prevent the convolutions of insulated wire from flying out of position by centrifugal force when in rapid rotation.

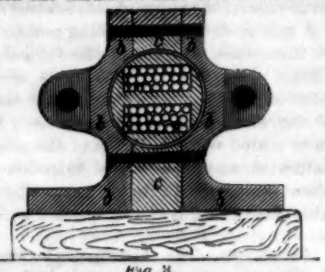


Fig. 3.

By means of the small strap *e* the armature is made to revolve in the interior of the magnet-cylinder at about 2500 revolutions per minute. During each revolution, two waves of electricity, moving in opposite directions, are induced in the insulated copper wire surrounding the armature. The rapid succession of alternating waves thus generated at the

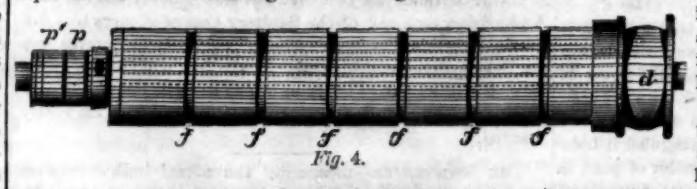


Fig. 4.

rate of 5000 per minute are, by means of the commutator at *g*, converted into an intermittent current moving in one direction only, which is conducted along the wires *h*.

The electro-magnetic machine by which the light is produced is of precisely the same construction as the magneto-electric machine just described, except that an electro-magnet *i* is substituted for the permanent magnets *a a*. The electro-magnet *i*, Figs. 1 and 2, is formed of two rectangular plates, *j*, of rolled iron, 36 inches in length, 26 inches in width, and 1 inch in thickness, as shown by the dotted lines. They are bolted, parallel with each other, to the sides of the magnet cylinder *k* by means of the bolts *l*, and the plates are connected together at their upper extremities by being bolted to a bridge formed of two thicknesses of the same iron as that of which the sides are made. All the component parts of the electro-magnet, requiring to be fitted together and to the magnet cylinder, are planed to a true surface, for the purpose of ensuring intimate metallic contact throughout the entire mass.

Each of the sides of the electro-magnet is coiled with an insulated conductor, consisting of a bundle of seven No. 10 copper wires, laid parallel to each other, and bound together with a double covering of linen tape. The length of conductor coiled around each side of the electro-magnet is 1650 feet. Two of the extremities of the coils are connected together so as to form a continuous circuit 3300 feet in length. The other extremities of the coils terminate in the two insulated metal studs *m m*, fixed upon the wooden top of the machine, and connected thereby with the wires *h h*. The total weight of the two coils of insulated copper wire, without the iron, is half a tun. The diameter of the hole in the magnet cylinder is 7 inches, and its length 35 inches. The separate parts of the cylinder are bolted together at the top and bottom by means of 12 copper bolts *n*, three-quarters of an inch in diameter. The armature *o*, which is an exact fac-simile, except as regards size, of the one already described, is about one-eighth of an inch less in diameter than the bore of the magnet cylinder. It is wound with an insulated strand of copper wire, 350 feet in length and a quarter of an inch in diameter, as shown in section in Fig. 3. A pulley *d*, 7 inches in diameter, is keyed upon one end of the armature, and upon the other end are fixed two hardened steel collars *p p*¹, one of which is insulated from the armature axis. These form part of the commutator, by means of which the rapidly alternating currents are converted into an intermittent current moving in one direction only. These currents of electricity, which produce the light, are taken from the steel collars by means of the springs *q q*, and thence to the screw nuts at *r*, from which they can be conveyed to any place required by the conductors *s s*.

The apparatus for the light is that ordinarily used with the galvanic battery and is shown at the lower part of Fig. 5; *t t'* are the carbon points, and *v* is a concave reflector.

The armature of the 7-inch machine is driven at 1800 revolutions per minute by means of the strap *s*, from the same shaft as the magneto-electric machine. Reservoirs for oil are shown at *u*. The total weight of the machine complete is a little more than 1 tun.

The action of the machine will be readily comprehended from the explanation previously given. The electricity induced from the permanent magnets *a a a*, in the rotating armature of the small machine, is transmitted, by means of the wires *h h*, through the coils of the large electro-magnet of the 7-inch machine, the iron plates and magnet cylinder of which acquire an enormous amount of magnetism. Simultaneously a porportionately larger amount of electricity is induced in the wires of the larger armature, and this current of electricity is used for producing the light. When the machine is in full action, an engine of about three horse power will be required to drive it, and the lamp will consume sticks of carbon at least ½ inch square. The power of the machine may be regulated according to the quantity of light required to suit the different conditions of the atmosphere, by placing small blocks of iron on the top of the small magnet cylinder *b b*, so as to connect the opposite poles, and proportionately diminish the power of the induced current in the armature.

This machine is, as already mentioned, considerably smaller than the one now in existence. In the former there are only two conversions: that is to say, a permanent magnet—an induced current of electricity—an electro-magnet—a more powerful induced current. In the large machine there is a still further multiplication of force. Its small magneto-electric machine has an armature of 1½ inch diameter, armed with six small permanent magnets, weighing 1 lb. each. The induced current from this is transmitted through the coils of the electro-magnet of a 5-inch [for the sake of convenience, the different-sized machines are distinguished by the calibre or bore of the magnet cylinders] electro-magnetic machine, and the direct current from the latter is simultaneously, and in like manner, transmitted through the coils of the electro-magnet of a 10-inch machine. The weight of the electro-magnet of the 10-inch machine is nearly three tuns, and the total weight of the instrument is about 4½ tuns. The machine is furnished with two armatures—one for the production of "intensity" and the other for the production of "quantity" effects. The intensity armature is coiled with an insulated conductor, consisting of a bundle of thirteen No. 11 copper wires, each 0·125 of an inch in diameter. The coil is 376 feet in length, and weighs 232 lbs. The quantity armature is enveloped with the folds of an insulated copper plate conductor 67 feet in length, the weight of which is 244 lbs.

With the three armatures driven at a uniform velocity of 1,500 revolutions per minute, an amount of magnetic force is developed in the large electro-magnet far exceeding any thing which has hitherto been produced, accompanied by the evolution of an amount of dynamic electricity from the quantity armature, so enormous as to melt pieces of cylindrical iron rod fifteen inches in length and fully one-quarter of an inch in diameter, and pieces of copper wire of the same length and one-eighth of an inch in diameter. With this armature in, the physiological effects of the current can be borne without inconvenience; immediately after 15 inches of iron bar had been melted, Mr. Crookes grasped the terminals, one in each hand, and sustained the full force of the current. The shocks were certainly severe, but not inconveniently so.

When the intensity armature was placed in the 7-inch magnet cylinder, the electricity melted 7 feet of No. 16 iron wire, and made a length of 21 feet of the same wire red-hot. The illuminating power of the current from this armature was of the most splendid description. When an electric lamp, furnished with rods of gas carbon half an inch square, was placed at the top of a lofty building, the light evolved from it was sufficient to cast the shadows of the flames of the street lamps, a quarter of a mile distant, upon the neighboring walls. When viewed from that distance, the rays proceeding from the reflector have all the rich effulgence of sunshine. With the reflector removed from the lamp, the bare light is estimated to have an intensity equal to 4,000 wax candles. A piece of ordinary sensitized paper, such as is used for photographic printing, when exposed to the action of the light for 20 seconds, at a distance of 2 feet from the reflector, was darkened to the same degree as a piece of the same sheet of paper was when exposed for a period of one minute to the direct rays of the sun at noon on a very clear day in the month of March. The day on which Mr. Crookes saw the machine at work (toward the end of June), the mid-day sun was shining brightly in at the window. He took the opportunity of roughly comparing the intensity of the sun with that of the electric light armed with the reflector. From a comparison of the shadows thrown by the same object, it appeared to him that the electric light had between three and four times the power of the sunlight. That the relative intensities were somewhat in this ratio, was evident from the powerful scorching action the electric light had on the face, and the ease with which paper could be set on fire with a burning glass introduced in the path of its rays.

The extraordinary calorific and illuminating powers of the 10-inch machine are all the more remarkable from the fact that they have their origin in six small permanent magnets, weighing only 1 lb. each, and only capable at most of sustaining collectively a weight of 60 lbs. When working up to its full intensity, it requires an engine of about 7 horse-power to drive it.

Science Familiarly Illustrated.

The Education of the Eye.

Our physical senses are unreliable until developed by use. The infant as readily reaches for the moon as for the rattle lying in his lap, and even apprentices to a mechanical occupation frequently make ludicrous mistakes until they have acquired that skill of vision usually known as the "mechanical eye," so necessary to every finished workman.

It should be the object of boys even in their sports to cultivate this sense of vision as a means to their after success if any mechanical branch is to be their business in life. For this reason the use of the fowling piece, rifle, and the bow and arrow is to be commended. By either of these the eye becomes accustomed to measuring distances. This quality of calculating distance is first acquired by the observation of the relative position of objects. If a rifle is used and the sight is adjusted to one hundred yards it is well to first measure the distance by a line, as a pocket tape, and gradually to become

accustomed to fix the distance by the eye without any mechanical aid. It is surprising how expert even a boy may become in measuring distances by practice. We said the noting of the relative position of objects should at first be used as a means to the end, but as soon as possible the tyro should emancipate himself from this dependence. After becoming familiar with distances on land the learner will find great difficulty in estimating distances on the water, especially on a smooth expanse, having no fixed objects above its surface. He will generally underrate the distance. So in measuring across depressions, as a valley or even a narrow gulley, every boy knows the liability and danger of such miscalculations. It may appear easy to leap from one bank to the other of a brook, but often his confidence in the uneducated eye may be punished by a good, thorough wetting.

The laws of optics should be made a study by the young. We well remember the many trials to which we were subjected when a boy in consequence of our ignorance of the refraction of light in passing from a medium like the air into a denser one, as water. The pickerel loves to sun himself lying in shallow water, just beneath the surface, where he remains perfectly motionless unless disturbed. The shooting of these fish, either with bow and arrow or with the fowling piece, is a common amusement, but he who would succeed must understand, in practice if not in theory, the refraction of rays of light. The fish is not where he appears to be when seen at an angle, as when the spectator is on the bank. If aimed at the shot will not touch him. This quality of light can be illustrated by thrusting a straight stick into still water, as in a pail or tub of water. At the point where the surface of the water touches the stick it will appear as if broken or bent at an angle.

Measurements on a much smaller scale are also useful as educators of the eye. After an examination of the foot rule with its divisions it is well to mentally calculate surfaces, as the length, width, and hight of a table, the dimensions of a block of wood, etc., and then to verify the calculation by the application of the rule, which may be at all times carried in the pocket.

These experiments may seem puerile, but the mechanic knows the value of them, and it is as well that the boy—the future apprentice and workman—should thus prepare himself for his course and make his way, as a learner, easier. No means to an end should be despised because of its apparent simplicity, and whether a man is a practical mechanic or not, he will often see the value of a correct eye in estimating and measuring.

OPENING OF THE PARIS EXPOSITION.

The Great Exposition of 1867 was opened on the day appointed, April 1st. It was a miracle of swift massing of work; but the imperial credit was involved in the punctuality of the performance, and it had to be done—albeit the clutter and confusion were most admirable. The weather was fine, eight thousand policemen kept everybody in statuesque propriety, and about five thousand guests were assembled or swallowed up in the immense gasometer (as it appears externally) which was dressed with innumerable flags of all patterns and hues of nationality. The distinguished and overdressed company inside received the Emperor and Empress in the central hall at two p. m. All nations were represented, in full national costume, from Paris around to Paris again. All did their best in their peculiar styles to welcome their magnificent host, on his approach; the English and Americans taking the lead with their boisterous fashion of "cheers" and "hurrahs." There were no ceremonies, other than a tour of the building and the personal and international greetings. But we must leave the rest of this to Mr. Jenkins, and turn to more practical matters.

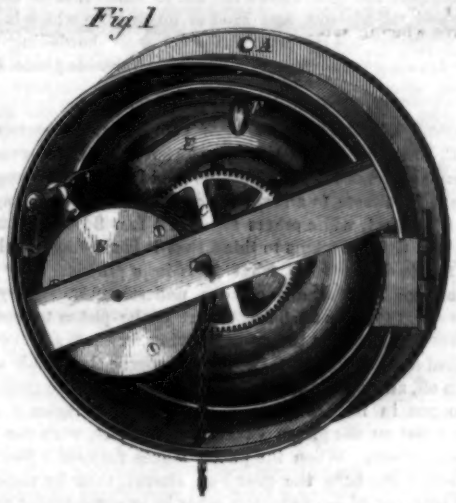
There is little to say. The Exposition is emphatically "open" now, and will not be filled up and fit to be seen until May. The concourse of strangers is nothing like what was expected, and the number of Americans not much greater than usual. May will put an end to this comfortable state of things, however, as well as to the easy vacuity of the exhibition galleries. At present not even the French space (which is half of the whole) is in order, and not one tenth of the foreign goods arrived are yet opened and arranged. Next to the French the Russian department is most advanced, and next to the Russian the English. The American department is one of the most incomplete, and complaint is poured upon the inefficiency of Commissioner Beckwith. Bad luck, or inefficiency, or possibly Congressional economy, has persecuted our exhibitors on the high seas, for it is reported that the only goods damaged on the voyage were American. They had the worst voyage to make. Our fine-art committee achieved honorable mention on the opening day for many good pictures well hung, but the English display was much greater. The only palm for America was carried off by our ladies, who were conceded the prize of beauty. But this, after all, like our reading and writing, comes by nature, in spite of the arts. It is of no use for the American ladies to vie with the French in paint and upholstery. The American *man*kind, however, may take a little credit for the bright atmosphere in which we rear our beauties.

The neighboring English, as might be expected, outdo us distant Americans from the start, in massive machinery; and Europe in general, with the advantage in age, cheap labor and proximity all on its side, excludes us as manufacturers, with a few exceptions, from the markets of the old world. As inventors we can hold our own anywhere, and for valuable patents the Exposition is of course of great advantage to Americans. In manufactures, indeed, our countrymen are able to do their native land great credit in almost every department. But it is at their own expense, and very rarely to their profit; and glad as we are to see our manufacturers so generously rivaling the world at Paris, for the honor of American industry, we have carefully abstained from seeming to incite hopes of reward. If the nature of the case were not demonstration in itself, our experience as Commissioner in 1855 at the beginning of these things, taught very impressively the cruel delusion of returns hoped for from manufactured samples in the bazaars of Europe. We have a world of our own: let us but make it our own, and we may leave the Old behind.

MASSEY'S SHIP LEAKAGE ALARM.

The dangers of the sea are not few nor insignificant. Among them is that of sinking in consequence of a leakage. Many a good ship has gone down carrying with her all her passengers, crew, and cargo by the insidious encroachments of a leak, which had attained large and fatal proportions before being discovered. It is evident, therefore, that any contrivance which would infallibly indicate the presence and progress of a leak would be of great value on all water craft.

Fig 1



Our two engravings show such a machine which does not depend entirely upon its intrinsic merits as claimed for it by the inventor, but has for its support the approval of such men as Admiral D D. Porter, Hugh McCulloch, Secretary of the Treasury; and of the officers detailed for naval inspection by the Government, the New York Board of Underwriters, and many other parties, competent to judge of its value, and whose recommendation carries with it the weight of position and competency. It is the subject of two patents, one dated August 11, 1857, and the other Feb. 19, 1867, granted to G. B. Massey, of New York City.

Fig. 2.

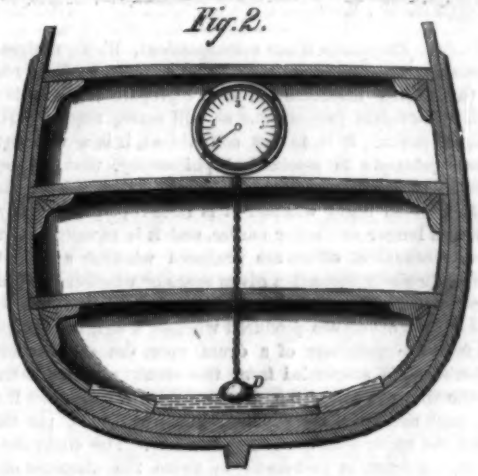


Fig. 1 represents an inside view of the apparatus, the dial having been removed. The machinery is inclosed in a circular box, A, of brass, and consists of a drum, B, holding a coiled spring, the tendency of which is to wind the chain upon the outside of the drum. On the bottom, or inside end of the shaft of drum, B, is a pinion which engages with the large gear, C, to the stud of which is secured an index hand, as seen in Fig. 2. This hand points to divisions of the dial plate, Fig. 2, proportioned to represent feet and inches. A float, D, Fig. 2, is attached to the chain and rests on the surface of the water in the ship's well. Now it will be seen that as the water rises the chain is slackened, allowing the coiled spring to revolve the drum, pinion, gear, and index, thus surely denoting the level of the water in the ship's hold at all times. As the water falls by pumping, the float, D, acts as a weight, rewinding the coiled spring.

In addition to this action of the apparatus as an indicator, it is also an alarm. Inside the case, A, is a bell, E, which is struck by a hammer, F. The hammer is actuated in this manner: The inside disk of the drum, B, is furnished with a circle of projecting pins which as the drum rotates engage with a jointed pawl to the hub of which the handle of the hammer, F, is secured. As the drum is rotated by the rise of the water the pawl is depressed, drawing back the hammer which is thrown with force against the rim of the bell by the tension of a spiral spring on the stud that supports the pawl. If, on the contrary, the drum rotates in the other direction by the lowering of the water, the jointed portion of the pawl yields and no action of the hammer is produced.

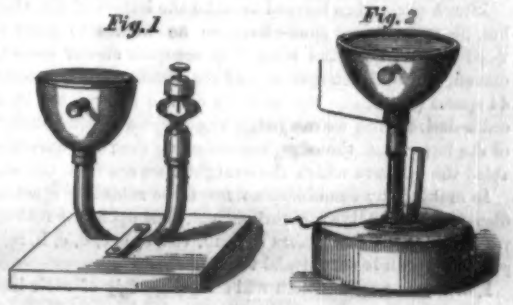
The advantages of this apparatus are obvious. The box can be secured as shown in Fig. 2, at any convenient point and will always show the state of water in the hold. Information relative to this gage may be obtained of the American Leakage Alarm Gage Company, No. 63 Broadway, New York City.

ANSELL'S FIRE DAMP INDICATOR.

The subjoined engravings represent the fire-damp indicator (Fig. 1), and the carbonic acid indicator (Fig. 2). The first is an iron funnel with a prolonged neck curved in the shape of the letter U, and fastened to its base in an erect position. The end of the U-shaped tube is fitted with a glass tube closed with a brass cap, through which passes a conductor of copper wire tipped with platinum, and of course insulated from the rest of the instrument. This wire is connected to one of the poles of an electro-magnetic apparatus, and the other pole is connected by another conductor to the lower part of the instrument. The top of the funnel is closed with a tile of wedgewood ware, and the neck is filled with mercury to within a sixteenth or thirty-second of an inch from the platinum point of the conductor. Whenever the dangerous gas begins to mingle with the surrounding atmosphere, it passes freely through the pores of the tile and mingles also with the air in the funnel, instantly pressing the mercury in the neck up into contact with the conductor, completing the electrical circuit, and setting in motion the mechanism of an alarm, within from two to four seconds, according to the distance left between the mercury and the conductor, from the first irruption of the gas. The "fire-damp," or light carburetted hydrogen, transpires through the tile nearly twice as fast as air, and thus creates a pressure exactly as any other body would if urged into the reservoir faster than the air can escape from it.

For the detection of carbonic acid, or "choke-damp" in the atmosphere of a mine, a modification of the instrument is used. For the wedgewood tile, a diaphragm of Sicilian marble is used. The wire with which the mercury is to be brought in contact, is introduced into the tube a little below the funnel, and the mercury is pressed upward and sustained in proximity to the point of the wire by a bag of air beneath it, pushed by a screw in the base of the instrument.

Fig. 1 *Fig. 2*



Thus the mercury virtually rests on an elastic cushion of air, and is balanced between the pressure of the compressed air in the bag, and the resistance of the air in the funnel. Whenever carbonic acid becomes present in the atmosphere, transpires through the porous diaphragm and mixes with the air in the funnel—nearly an equal volume of the air being at the same time displaced and passing out—the mixture resulting becomes more compressible than air, presents diminished resistance to the mercury pressed upward by the elasticity of the air cushion beneath, and consequently the mercury rises sufficiently to touch the conductor, complete the electric circuit and actuate the alarm. The wine and beer makers are expected to find this instrument valuable for detecting the commencement of fermentation.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

A Substitute for the Try Square Wanted.

MESSRS. EDITORS:—A suggestion thrown out in your journal has several times, to my knowledge, called out inventions of importance by directing inventive talent to a public want.

Perhaps another would fill a want for some kind of trying implement for joiners and other workers in wood to use in squaring up stuff with planes. The ordinary try square is rather an imperfect implement for such purposes from the difficulty of seeing when it fits, particularly in a side sight. It is also inconvenient from the fact that the workman has to stoop down in an awkward and tiresome position to apply it. We want something that can be used without stooping and that can be used in any kind of sight, and if possible something that will secure greater accuracy in squaring up. It would also add to its convenience if it could be retained in the hand while planing, and applied without removing the plane from long pieces. J. KIRKER.

Cincinnati, Ohio.

Spacing of Letters.

MESSRS. EDITORS:—I send you an article on a subject which I think will interest many of your readers, and may perhaps be of great assistance. It is on lettering. Although a great many works have been written on this subject, the authors seem to have given their attention merely to the construction of the letters, and a great many excellent works have been written on this special part; but none of them (so far as I can learn) have given their thoughts to the very important art of spacing. Poor spacing is a bad fault, and to remedy this evil, and aid those who have not a natural taste, and also in some degree those who have a taste for drawing, I will mention a

few rules which I think will be of practical value to the draftsman.

These rules were established by observing the manner in which type are constructed; that is, by measuring and comparing different founders' castings.

Every letter used in printing is upon one end of a rectangular prism (which we will call the body), and no matter where each letter is placed, whether it be beside an O or an M, the body of the letter always remains the same in the same sized letters. This being the case, if we wish to establish rules for spacing, it is only necessary to ascertain accurately the size of the body of each letter in the alphabet. This I have done for both the upper and lower cases together with the numerals.

We all know that the body of each letter is the same size one way, i. e., in hight, and only varies in width. The way in which I have arrived at these rules is this: I have drawn each letter carefully, and found the space which it occupies. Now the end of the body is wider than the letter itself, and after drawing the letters, the following way of determining the size of the body has been adopted. In examining the letters of the alphabet we find that some of them are composed of straight, others of curved lines. I have taken for my base ten divisions, which I call spaces. Suppose I have an O, which letter itself is the same in width as in hight (which would be ten spaces) I add to each side one half space, thus giving me the width of the body as eleven spaces, and we have this rule for the distance of the curved edge of the letter from the edge of the body, viz., one half space. In the case of straight line letters, as in H, for instance, the letter itself is eight spaces wide. I add to each side one and a half space, thus making the body eleven spaces in width, and I have for the distance of all straight-line letters from the edge of the body one and a half spaces. The above rules are for capitals.

In the lower case I have taken the hight for the letter as six and a half spaces and the distance of the letter from the edge of the body, for curves one fourth, and for straight lines three fourths of a space. We see from the above rules that the distance of curved lines from the edge of the body is one third of the distance of straight lines from the edge, both in the upper and lower cases.

After a person has learned to make the letters of the alphabet, he will proceed thus—Suppose he wishes to print the word GOOD; here the body of G occupies eleven spaces, O eleven, and D eleven spaces, and the whole word will occupy 44 spaces (capitals). We now lay off the four spaces in the order desired, and we can judge by our eye about the distance of the letter from the edge, remembering the rule: curves one third the distance which the straight lines are from the edge.

In making my examinations for these rules for spacing I discovered the following curious fact, that upon one letter, o we can make eleven letters depend, viz., a, b, c, d, e, h, m, n,, p, q, u—which is very useful to remember

I will give a table which will show the body of each letter in the alphabet: Hight—10 spaces. Width—B, F, P, ten spaces; A, C, D, E, G, H, K, N, O, Q, T, T, V, X and Y, eleven spaces; I, five spaces; J, eight spaces; S and L, nine spaces; E, thirteen spaces; W, seventeen spaces; Z and &, twelve spaces. Numerals—1 equals five spaces; 2, 3, 5, 7, 8, nine spaces; 4, eleven spaces; 6, 9, 0, ten spaces. Lower Case—hight 6½ spaces. a, b, d, k, p, q, x and z, equal seven and a half spaces, or three fourths of the hight of capitals; c, e, o, s, seven spaces; f, i, j, l, t, three spaces; g, h, n, u, eight spaces; m, thirteen spaces; r, v, y, six spaces; w, ten spaces.

Albert F. Hall.

Charlestown, Mass.

Ventilators Operated by Solar Heat.

Messrs. Editors:—In your issue of March 9th, page 156, Mr. Boyd, of Boston, is represented as having exhibited a new ventilator in which the solar rays are employed to heat a chamber placed directly over the mouth of the ventilating tube and so rarify the air at that point, which of course would cause an upward current in the air, even when there was no wind to act upon the ventilator. If I understand his plan this chamber is formed of two cones joined at their bases the apex of one cone pointing down the tube. If such is the formation I can inform you that precisely that plan is now and has been for the last eight years in use on no less than thirty of the public schools of this city. On one of them the ventilators were painted black to attract the sun's rays and intensify the heat of the cones. B. F. Miller.

New York City, March 28 1867.

Tempering Steel.

Messrs. Editors:—The tempering of steel tools seems to be a subject of discussion between correspondents V., and W. L. Dolbier, in numbers 7 and 12 current volume. Both appear to rely upon the color the surface of the steel assumes while drawing the temper after hardening, in order to determine the proper degree of hardness to the tool that it may best perform its part in the work designed. I believe both to be in error. By experience I have found that we can neither depend upon the degree of polish nor color of surface. The secret lies in the working of the steel, and in the proper degree of heat given the steel to be hardened. You cannot tell that a piece of steel is hard or soft by polishing its surface and then exposing it to the heat and watching the different colors, for the same colors will appear on steel that has never been hardened as on a hardened piece when exposed to the same degree of heat. There are so many tools made from steel each having its own peculiar duty to perform, requiring a special temper, that in my opinion there can be no fixed rule laid down to govern the art of tempering steel tools. To become an expert in the business requires judgement, close attention and long experience. It is a fact that there are more butchers of steel, disguised as blacksmiths, who are sure to destroy the life of a piece of steel the first time they place it in the fire than there are of those who understand steel or even know anything about its nature. If a tool does not stand after going through their butchering process the fault is laid to the steel, the quality is bad, etc. For hardening I believe that steel should never be heated above a cherry red, and dark at that, and then in drawing the temper one must be governed by experience. W. L. D., should not mind as to what degree of polish he gives his steel providing he still persists in risking the merits of the tools he tempers by the color; all that is necessary is to remove the outside or scale so that you have a white surface. E. M. F.

Springfield, Ohio.

[Our correspondent is undoubtedly correct in his belief that judgement, close attention, and long experience is necessary to give assurance of success in working and tempering steel. It is an art not to be learned from verbal instructions alone. But his experience differs from ours if no dependence can be placed upon the color of steel in tempering. If he who tempers the tool knows the use to which it is to be applied, and the amount and kind of forging to which it has been subjected, the color on the steel, after hardening and while drawing the temper, is, we think, a valuable guide. Eds]

The Crank Motion.

Messrs. Editors:—In No. 13 of your journal a correspondent, P. Y. seems very desirous to know what is the average leverage of a crank 4 feet long as used in the steam engine. Then he professes to answer the question himself by saying that it is 2 feet, while others say it is 2 feet 8 inches; but at the same time he seems to think that it is all guess work. I will try to demonstrate what it is in a practical way and make it so plain that any one can understand it. Every one knows that it takes an 8 feet stroke of the piston to operate a 4-feet crank so that the piston moving forward and back it has had a motion of 16 feet. Now suppose the crank to be taken off, and a gear 16 feet in circumference at the pitch line to be put in its place. Next put two long racks a little over 8-feet on the piston with teeth to mesh with the gear between them. When the piston moves forward 8 feet it is evident it will turn the gear half around, then by throwing that rack out of gear and the other in by some proper means at the right time the piston will with the rack moving back finish one revolution of the gear with the same leverage in every part of the stroke, and also the motion the same in every part of the stroke, and the amount of leverage used is just half the diameter of the gear which is 2 feet $\frac{546}{1000}$, and that must be the average leverage of a 4-feet crank, and while two strokes of the piston moves the gear at the pitch line only 16 feet, it moves the crank pin 25 feet $\frac{132}{100}$, and also while the gear would move one foot the crank pin would move with the same piston 1 foot and $\frac{57}{400}$.

Wm. Hall.

North Adams, Mass.

Messrs. Editors:—Your correspondent, P. Y., desires to have shown the average leverage of a crank, without resort to the higher mathematics, and I propose to show it by such self-evident propositions as will scarce require further demonstration. If it is not self-evident, it is a well established principle in mechanical philosophy, that an equal amount of work or mechanical effect is required to raise a body a given hight whether it is raised perpendicularly or through longer or shorter curves, and it is equally true that equal mechanical effects are produced whether a body falls perpendicularly through a given space or whether it describes a curve in its fall. This being admitted, it follows that equal mechanical effects are produced whether a weight is suspended from the periphery of a drum upon the crank shaft, or whether it is suspended from the crank pin by means of connecting rod and piston, provided that in both cases it falls through the same perpendicular space while the pin moves from the upper dead center to the lower. The circumference of such a drum is just equal to twice the diameter of the circle which the crank pin describes, and the average leverage of the crank is just equal to the radius of the drum, which, being a uniform is consequently the average lever. The circumference of the drum being given, the radius is formed by the rule which shows the relation of the diameter to the circumference, and which is, to divide the circumference by 3.1416 to find the diameter, half of which is the radius. The average leverage of a 4-feet crank is 2.5464 feet.

Providence, R. I. E. M. Chaffee.

Mean Leverage of the Crank.

Messrs. Editors:—In the Scientific American of 30th March, page 202, a correspondent ("P. Y.") asks for the mean leverage of a crank four feet long—by which is understood the leverage required under a uniform force on the crank during the entire stroke, that should be equal to it, actual and usual working.

The mean leverage of all cranks is as 0·6367 to 1, consequently 2·547 is the mean for a 4-foot crank.

Let the constant force=1. Then

2·547 leverage×1 force=2·547,

and 4×0·6367=2·547.

While the above shows the equal latent force of the two leverages, the respective distances moved determines the mechanical effect.

For 2·547 leverage—8 half circle×1 force=8 effect.

4—12·566×0·6367=8 effect.

The ratio of 0·6367 to 1 for mean leverage remains correct for all lengths of connecting rod, and is found by dividing the stroke by the half-circle path of the crank.

Thos. W. Bakewell.

Cincinnati, March, 1867.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

Beehive.—Hamilton Clipp, Orange, Ind.—This invention consists in the combination of a feeding trough with the interior boxes of the hive, so that the bees, when not at work, may be provided with food in such a manner as to prevent their escape or disturbance, and in the combination of a sliding and a fixed grate with each other and with the second interior box, so that the bees may be shut into the upper boxes, when it is desired to remove the lower box to destroy moths, or for any other purpose.

Washing Machine.—Robert E. Downie and H. C. Johnson, Delevan, Wis.—This invention consists in providing open rubbers for a washing machine, in such a manner that the water will readily pass through between the rubbers when the machine is in operation.

Turning Irregular Forms.—A R. Stewart, Douglas Harbor Canning, N. B.—This invention relates to a new and improved method of turning irregular forms whereby duplicate cutters may be used on the same piece of wood and to the manner in which the cutters are arranged and operated.

Soda Fountain.—T. A. Long, Meadville, Pa.—This invention consists in placing the materials of which soda-water is formed in a suitable vessel, and forcing the same into an air chamber, whence the soda-water is expelled by the force of the compressed air in the chamber: also in making the apparatus portable.

Frame for Railroad Car Bodies.—S. Merrick, New Brighton, Pa.—This invention relates to improvements in the construction of iron frames of railroad cars, and consists in applying arch trusses in the center and ends of the sides, in combination with the main sills and stanchions, and also tying the main and cross sills with a flat, horizontal plate, in such a manner that all the parts of the frame shall be firmly secured to each other, and so connected and related as to be self supporting, independent of panels or lining.

Shrinking Wagon Tires.—Caleb Jackson, York, Ill.—This invention has for its object to furnish an improved tire-shrinking machine, simple in construction, effective in operation, and which can be operated by one man.

Device for Moving Pianofortes.—D. J. Langworthy, Jamestown, N. Y.—By this mover pianofortes can be taken down, moved, and set up with safety, expedition, and with much less labor than is now required.

Sleigh.—W. H. Huyck, Charlton, Iowa.—This invention relates to the manner of constructing the lower portion of a sleigh on which the body is supported, whereby a very strong and durable sleigh is obtained at a much less cost than by the ordinary mode of manufacture.

Grain Cradle.—C. P. Kelsey, Livingstonville, N. Y.—This invention consists in a peculiar manner of securing the fingers of the cradle to the braces and cross bars, whereby they may, with the greatest facility, be adjusted to suit the length of the scythe.

Cleaning Flax and Hemp.—Arnold Gartner, New York City.—This invention relates to a flax or hemp brake, which is composed of a hollow drum made of perforated sheet metal, and provided with a series of beaters and flyers, which are arranged in lines at suitable distance apart. The flyers are rigidly secured to the periphery of the drum, but the beaters are hung on gudgeons so that they are yielding, whereby injury to the fibers is prevented. The flax or hemp is fed to the machine over curved adjustable aprons which extend downward, so that the dust and dirt are carried down, and by using a foraminous drum the draught of air is materially diminished, and the dust and dirt are less liable to cause inconvenience to the workman than in machines of the ordinary construction.

Car Coupling.—J. H. Harris, Virginia, Ill.—This invention consists in constructing a car coupling in such a manner that when the cars are coupled it brings the platform of the cars so near together that a person cannot fall between them, thus preventing many accidents to which railroad men are daily exposed.

Combined Swift and Reel.—G. W. Horton, Belvedere, Ill.—The object of this invention is to construct a reel or swift for winding up yarn, which may, without the use of set or other screws, be easily secured to any table or chair back in a horizontal or vertical position, and which can, when not used, be folded up so as to fill the least possible room, and which is connected with an indicator wheel whereby the number of revolutions of the reel can be accurately ascertained, and consequently also the length of the yarn wound around the same.

Saw.—E. W. Tilton, Oshkosh, Wis.—This invention relates to the manner in which an upright or horizontal saw is made to saw circular forms, such as felloes for wagon wheels or other circular bodies, staves for barrels, and all work of that description.

Regulator for Watches.—Augustine Jewett, Boston, Mass.—The object of this invention is to enable the movement of a watch to be regulated to a degree as near as it is capable of running with certainty and ease.

Loom.—Willoughby W. and Varnum J. Phillips, Wellsville, N. Y.—In this loom the pawls, ratchet wheels, and cams, which operate the shuttle, are arranged in a novel and ingenious manner, and ensure a uniform and perfect operation.

Wind Mill.—H. P. Gallup, Medina, Mich.—This invention has for its object to furnish an improved wind mill, simple in construction, cheap, durable, and strong, and easily regulated to run fast or slow as desired.

Carriage Step.—John H. Yager, Trenton, Ohio.—By this invention the construction of carriage steps is much simplified and cheapened, as well as rendered more practical and efficient.

Wrench.—Samuel S. Barnaby, Chicago, Ill.—This invention consists in a novel arrangement of the movable jaw of a wrench with regard to its fixed jaw, whereby it can be readily adjusted and set at any desired position.

Plow Sulky.—Daniel W. Colburn, Loami, Ill.—This invention relates to a carriage or vehicle which is so constructed that any of the ordinary plows in common use may be attached, and the labor of plowing performed while the driver can ride and make the work easy.

Carriage Step.—Francis Baker, New York City.—By the construction of carriage steps embraced in this invention, when not in use, they can be wholly incased within the body of the carriage and thus concealed from view.

Repeater Fire-arms.—Peter Sheckler, Orangeville, Ill.—This invention relates to the combination and arrangement of parts by which the cartridges are introduced into the magazine of the gun, moved forward therein, and guided into the rear end of the bore of the gun, and to the combination and arrangement of parts by means of which the gun is cocked and discharged.

Shirt Stud.—Patrick Kenny, New York City.—This invention is designed to furnish a shirt stud, by the use of which from the elasticity of the connection between the plates, the button holes in the shirt bosom will be less liable to be torn or injured, and which will be more easily inserted and removed than the studs now in common use with rigid connection.

Sink or Water Trap.—John E. Taber, Fall River, Mass.—The object of this invention is to provide a safeguard against the impure air and foul vapor which arise from sink spouts, cess-pools, or water closets, and also to prevent the evaporation of liquids where they are exposed to the atmosphere.

Sleigh Runner.—Charles Stoddard, Hancock, N. Y.—This invention has for its object to so improve the construction of sleigh runners that the shoe may be held firmly and securely in place, even should it become broken while in use.

Watch.—J. A. Hamann, New York City.—This invention consists in so constructing the pendant of a watch as to receive and hold the key for winding and setting the movement of the watch.

Steam Boiler.—Thomas Helt, Trieste, Austria.—This invention consists in constructing steam boilers or steam generators, both for marine and land service, in such a manner that while the evaporation power of the boiler is not diminished, the dimensions of the boiler may be materially lessened, whereby fuel is greatly economised.

DOOR STRIP.—J. P. Force and W. W. Egnew, Jarvis, Ind.—The door strip is hinged to the threshold so as to vibrate downward in the direction of the motion of the opening door, when the door is closed it strikes against an arm of the rock shaft which elevates the edge of the strip so as to form a valve to close the opening under the door.

GATHERING APPLES AND OTHER FRUIT.—H. F. Wadhams, South Dansville, N. Y.—This invention consists in the application to the body of an apple or other fruit tree of a fruit receiver constructed of canvas or other suitable cloth arranged in such a manner that it will receive the fruit when the tree is shaken without injuring the fruit in the least, thereby avoiding the tedious labor of picking by hand.

SEWING MACHINE.—George S. Darling, Bridgeport, Conn.—This invention consists in connecting the presser foot with the take up or with the thread controller, or with both, in such a manner that the supply of thread to the needle regulates itself according to the thickness of the material to be sewed.

SCAFFOLD.—Horace Littlefield, Lewis, Iowa.—This invention relates to a scaffold which can be folded for transportation, and which can be arranged higher or lower as may be desired.

HAT BLOCKING MACHINE.—S. S. Middlebrook, Sandy Hook, Conn.—This invention relates to a machine by which the conical hat body is gradually transformed into a perfectly shaped hat and consists of three distinct portions, through each of which the hat body is passed before its shape is perfected.

LIFTING APPARATUS.—Wilson L. Jones, Baldwin City, Kansas.—This invention has for its object to furnish an improved lifting apparatus by means of which heavy weights or burdens may be lifted readily and conveniently.

WASHING MACHINE.—William A. Terry, Prairie du Chien.—This invention consists in the combination of a vertical shaft to the lower end of which the movable rubber is attached with the pinion wheel by which said shaft is operated so that the said shaft may move freely up and down to enable the rubber to adjust itself to the various thicknesses of clothes to be washed.

MACHINE FOR MOLDING POTTERY.—A. Keil and John Tresch, New York City.—This invention relates to a machine whereby flower pots and similar articles of pottery can be molded in the shortest possible time and in a simple manner.

APPARATUS FOR MAKING VINEGAR.—Theodor Grundmann, Milwaukie, Wis.—This invention consists in the construction of the troughs through which the liquid, which is to be transformed into vinegar is passed. These troughs are placed on a perfect level and are provided with vertical walls for detaining the liquid in its passage, and by which the same is made to transverse hundreds of feet in a trough of from 12 to 20 feet in length. These troughs are placed one above the other, the upper one serving as cover for the one below.

TRIMMING METAL AND OTHER PLATES.—J. H. Ferguson, and H. W. Lovejoy, New York City.—This invention relates to a machine by which the edges of metallic or other plates can be chamfered off and the roughness removed, leaving the edges round and smooth.

MACHINE FOR MAKING TROUGHS.—Albert T. Stearns, Dorchester, Mass.—This invention relates to an improvement in that class of machines for making troughs in which a cylindrical saw is used to cut out the required cavity. In ordinary machines of this class the stick of timber is secured to a reciprocating carriage by means of dogs so that that side of the stick which rests on the carriage and its back cannot be reached by cutters while the stick passes through the machine and furthermore, much time is lost in gigging back and in removing, replacing and dogging the sticks.

DRILLING OIL WELLS.—Nelson Pontious, Hallsville, Ohio.—The object of this invention is to provide means for automatically turning drilling tools in the bore of an oil or other artesian well and also to reverse the direction of rotation by automatic action through the vibration of the walking beam.

SHIFTING RAIL FOR BUGGIES AND WAGONS.—Alonzo E. Bailey, Middleville, N. Y.—This improvement relates to the manner in which the rails for the back and the rail for the top are shifted from one vehicle to another.

CHURN.—George Deckman, Malvern, Ohio.—This invention has for its object to improve the construction and application of Deckman's improved churn dasher patented July 31, 1866, and numbered 56,728.

OIL CAN.—J. A. Waltman, Auburn, Me.—This invention consists in forming a funnel shaped collar around the tube of the oil can which catches and holds the oil which would otherwise drop from the tube and be wasted.

WEED CUTTER.—C. G. Lathrop, San Jose, Cal.—This invention relates to an apparatus for reducing manual labor in eradicating weeds and also for completely destroying the latter. It consists chiefly in the use of a V-shaped horizontal cutter which is secured to a standard that is attached to the underside of a common plow beam.

DENTISTS' VULCANIZING FLASK.—Henry F. Clark, Poughkeepsie, N. Y.—This invention relates to the manner in which the parts of the flask are secured together.

DOUBLE-ACTING SASH FASTENER.—John Wiard, New Britain, Conn.—The object of this invention is to so arrange and construct a sash fastener which is to be applied to weighted sashes that the latter will not only be locked when the window is closed but also in any other desired position.

GATE.—S. E. Anthony, Stillwater, N. Y.—This invention relates to a gate of that class which are constructed and arranged in such a manner as to slide longitudinally a certain distance and then swing or turn entirely open. The object of the invention is to obtain a gate of the class specified which may be opened and closed with greater facility than hitherto and be stronger and more durable.

SURFACE CONDUCTOR FOR ELECTROTYPING.—Samuel Hallock, New York City.—This invention relates to a mode of electrotyping and consists in applying a metal conductor of electricity to the surface of the mold to be electrotyped instead of the usual method of employing wire pins pierced through the wax mold in contact with the bottom of the pan.

ATTACHMENT TO MILLSTONES FOR COOLING THE MEAL, ETC.—M. Cosgro, Peoria, Ill.—This invention relates to improvements in devices applied to millstones for the purpose of cooling the meal, dissipating the moisture arising from the grain generally in grinding and keeping the curb clean and dry.

LITHOGRAPHIC PRESS.—Geo. Dunlop, Brooklyn, E. D., N. Y.—This invention relates to a printing press which may be properly termed a litho-chromatic printing machine, a carriage or truck being provided which forms the bearings for the wetting roller, for a sectional inking-in roller, and for one or more ordinary inking-in rollers and which operates in combination with a sectional and with an ordinary feed roller in such a manner that by pushing said carriage back and forth the inking-in rollers are charged with ink and the ink is transferred to the stone so as to produce the desired shade.

LATHE FOR TURNING LASTS.—Mathias Spenil, Detroit, Mich.—This invention relates to a lathe which is so constructed that the right and left last may be turned simultaneously and furthermore a small last may be turned from a large pattern or vice versa.

TREADLE FOR SEWING MACHINES, ETC.—John G. Folsom, Winchendon, Mass., and W. Clair Anderson, St. Louis, Mo.—This invention relates to a treadle attachment for sewing machines and for other small machines, which attachment is so constructed that the machine to be operated can be placed on a common table and by stepping with the foot in the treadle the desired motion can be effected.

THE MARKETS.

The entire prostration of business which has been so characteristic of the past few months, seems gradually to be relaxing itself and slowly and imperceptibly regaining vitality. As anticipated, the arrival of spring has brought with it some little activity though the volume of trade far from reaches its ordinary magnitude and the season is so far advanced that no hopes are indulged in, that the customary briskness will be realized this year.

COMMERCE OF GREAT BRITAIN.—The British Board of Trade's returns for the past year give the total value of exportations to have been valued at £186,827,795, which is an increase of fourteen per cent over the total of the preceding year and eighteen per cent over that of 1864.

COTTON.—From the same report we learn that the shipments of cotton manufacturers was in value £60,905,022, showing an increase of thirty per cent on that of the year preceding. The imports during the year were 12,205,969 cwt., against 8,731,949 in 1865. Of this supply 4,643,270 cwt. were received from the United States against 1,213,790 in 1865 and 136,322 in 1864. The last monthly report on the condition of the Liverpool cotton market concludes that from present prospects there is no room for any serious decline below the present prices, nor, owing to the state of the manufacturing trade, need any marked advance be anticipated, but it seems probable that a period of healthy activity and moderate prices is not far distant.

WOOL.—In 1820 the total value of the woolen manufacturers of the United States was $14,500,000; in 1840 it amounted to $30,700,000; ten years later the valuation was $43,200,000, and in 1860 it reached its highest figure before the war, viz., $68,900,000, during which year 80,386,537 lbs. were consumed. During the four years of war the consumption of wool for manufacturing purposes increased from 104,980,000 lbs. in 1862 to 143,878,000 lbs. in 1865. The market being overstocked at the close of the war, Government being no longer a buyer, prices fell heavily. Many large mills were compelled to succumb, and many more are now idle or running at a loss. The new tariff seems to have been framed wholly in the interests of wool growers and is so extreme that it is believed it will defeat its own end.

COPPER.—The copper resources of the Pacific coast are steadily gaining in importance. While in 1862 the whole exports amounted to 3,000 tuns, last year 21,476 tuns were shipped from the port of San Francisco, an increase of nearly 18,000 tuns in five years.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

E. L. B., of N. Y.—1. "What is the explanation of the sound produced by the cracking of a whip? 2. What is the cause of the light seen in the eye when you close it and press the finger on one side of the ball?" (1) The concussion of the lash with the air and the concussion of air in closing up the vacuum left in the path of the lash. The sound produced by the concussion of air with air is illustrated by the the whistling of a bullet. (2.) The light is probably an optical illusion. The ordinary sensation of sight is supposed to be due to the mechanical force of light acting on the optic nerve, and the compression of the eyeball acts upon the nerve probably in a somewhat similar manner.

S. T. R., of N. Y.—Our instruments are not sufficiently sensitive to detect any attraction beyond a few feet from a magnet. But if the law that the attraction varies inversely as the square of the distance is rigidly true, the attraction of a magnet, however small extends to the ends of the universe.

T. L., of Pa.—All in the Northern Hemisphere, agree to call March April and May the spring months, but some reckon the beginning of spring at the vernal equinox, about the 21st of March.

G. B. F., of Montana has been assured by what was sufficient testimony for him that a stone has been discovered which attracts gold as the loadstone does iron, and he expects to come into possession of such a stone. He says: "I scouted the idea at first but was finally forced to believe it from the testimony of dozens of perfectly reliable persons, and I am now on track of such a piece of rock which I hope to procure for the advancement of science!" . . . There is no special treatise on the spectroscope and spectrum analysis. But abundance of information on the subject may be found in recent treatises on chemistry and especially in Fresenius' "Qualitative Analysis." Spectroscopes are made in this city and may be procured from the dealers in philosophical instruments.

M. M. R., of N. Y.—We are not aware that any thing has ever been put into hydraulic lime when used for lining cisterns to prevent its hardening the water. We would suggest as a possible preventive, to wash the surface of the plastering after it has become set with a weak solution of silicate of soda or soluble glass.

S. M., of Ill.—To silver mirrors the glass must be carefully cleaned and the mercury and tin foil should be pure. The mercury is best purified by distillation. The tin foil most commonly sold, contains more lead than tin. . . . We know of no more perfect way of decolorizing sorgo sirup than by filtering it through animal charcoal. The process, however, is commonly considered too expensive for so crude a material as sorgo sirup. Bullock's blood is only useful for clarifying. It contains albumen which on coagulating entangles, and carries with it the floating solid particles which made the liquid turbid. Our correspondent thinks his sirup is darker on account of the cane having been raised on dark bottom land; a new theory to us.

A. F. F., of Wis., says that some months since he addressed to the editor of the *Clipper* the following question: Suppose a man to be in Washington, D. C. at 12 o'clock noon on Monday, and he were able to travel fast enough to keep directly under the sun, and by so doing in 24 hours he would arrive in Washington again, but it would be Tuesday. Where would the first point be struck that the people at that point would call Tuesday, it being noon with the man the whole 24 hours." He received the following answer: "I guess he would or any other man."

J. F. H., of N. Y.—A conducting surface is given to wax for electrotyping by brushing over the wax fine plumbago. Another way is to moisten the surface with a solution of nitrate of silver and shortly after pour on a weak solution of pyrogallic acid.

W. H., of Pa.—In former volumes we have given pretty full details of the manufacture and uses of aluminium. The Wurtz amalgamation Co., have erected a large factory for the manufacture of sodium and they have facilities for producing aluminium on the large scale. Up to the present time, however, it has been prepared in America only in small quantities.

E. G., of Mich.—For the ascending power of balloons see page 158.

H. B. L., of R. I.—We have no more explanation of the cause of elasticity than we have of gravitation. Elasticity is a name we give to certain phenomena about the nature of which we know very little. . . The theory of spontaneous generation is now generally abandoned. It has been demonstrated that in most of the supposed cases, the germs of life came from the air or other matter where they are known to flourish. The germs of the maggots which breed in the middle of a cheese, may have got into it when it was milk, either from the air or from the cow with the iron tail.

W. K. N., of N. Y.—There is no doubt of the truth of the statements often made that a rifle ball may be fired through a pane of glass, and leave a hole without cracks, and that a candle may be fired through a board. In trying the experiment you might have a dozen failures to one complete success.

E. G. G., of Mich.—There are many plants which contain oxalic acid, but it is not now profitable to extract it from them. Till within a few years it was manufactured from sugar and nitric acid. At the present time the raw materials used are saw dust and soda.

D. C. S., of Ind.—The common mouth blow pipe is used in soldering small articles of silver and gold. The flux used is borax. . . . You can get wire gages at the hardware stores.

M. L. M., of N. Y., wishes to get a noon mark or meridiam without using a compass or chronometer. There are several ways; perhaps the following is the simplest. The shortest shadows are at noon select some high point (as the top of a church spire) and the direction to this point, from the point of shortest shadow, is in the meridian.

R. M., of Ill., says there is an article extensively in use in England for facing cards and whitening straw under the name of "white paste" What is it? He says it is not white lead.

J. L., of O.—We suggest that you apply to the professor of chemistry at the medical college in your city for the testing by the spectroscope of the matter you speak about. If you prefer, however, to send it to us, do so, and we will examine it.

W. H., of Ill.—Please read your paper more carefully. You will find answers to all your questions in recent numbers.

N. W. C., of Vt.—Ransome's artificial stone is most talked about and is probably the best of its kind. It is not made in this country.

J. W., of Pa.—If you immerse an engraving or a printed page in a weak solution of potash, the ink becomes softened. Dip the paper in a weak acid solution, and then lay it on a lithographic stone and roll through the press. The impression will be transferred to the stone and copies may be printed from the stone in the usual way. This is known as the anastatic process. There are several other processes for copying printed matter, but the one most generally used is that by photography. The preparation to which you refer is probably a spirit varnish. The varnish is applied to the print and the print is thus attached face on to a smooth surface of glass wood or metal. After the varnish becomes dry and hard the paper is moistened with water and becoming softened is rubbed off leaving the impression in the varnish. This last process is used for ornamenting fancy boxes, glass vases, etc. With care you may in the same way make transparencies for the magic lantern.

T. M. S. Jr., of Ga., asks if the top of a wagon wheel *turns* faster than the bottom. We reply: it does not. A point at the top of a wheel moving over a level plane, as a wagon wheel, *moves* through a greater space in the same time than a point on the lower side opposite does. This appears to be a ratio between the terms *turn*, as a periphery turning about its axis of rotation, and *move* as denoting the distance traveled by the different parts of a wheel.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

NEW PUBLICATIONS.

GENERAL PROBLEMS OF SHADES AND SHADOWS, Formed both by Parallel and Radial Rays, etc. By S. Edward Warren, E. C. New York: John Wiley & Son, 535 Broadway.

The author of this volume is too well known, from his previous works on geometry and its departments, to require any certificate as to the value of this present publication. Such a work is invaluable to the engineer, draftsman, and mechanic, and as a means of amusement and of intellectual discipline, it is eminently attractive. The volume is illustrated with numerous plates engraved on a large scale. Lovers of the noble science of geometry who are in possession of Mr. Warren's previous treatises will not neglect to procure this interesting volume.

GROUP OF QUAIL.

Messrs. L. Prang & Co., Boston, have just issued another of their beautiful Chromos, representing a group of Quails, after a painting by A. F. Tait. This Chromo was printed from nineteen stones, and is similar to the Ducklings and Chickens issued last year. The resemblance to oil painting is so close that it requires an eye skilled in the arts to detect the difference.

THE ATLANTIC MONTHLY

For April is brim full of very choice reading. Among the contributors are Oliver Wendell Holmes, Edward E. Hale, T. B. Read, Bayard Taylor, James R. Lowell, and others.

THE ANNUAL OF SCIENTIFIC DISCOVERY—

A Manual indispensable to every one interested in arts or sciences—is issued for 1868-7 under the editorial charge of Dr. Samuel Kneeland. In the able hands of the new editor the high position established for this publication by its originator, David A. Wells, will be well sustained. Mr. Wells, engrossed with important duties as Commissioner of Revenue, gives in this volume a temporary (at least) valedictory to the readers of the Annual.

THE AMERICAN GARDENERS' ASSISTANT; Containing Complete Practical directions for the Cultivation of Vegetables, Flowers, Fruit Trees, and Grape Vines. By Thomas Bridgman. New Edition, revised, enlarged, and illustrated by S. Edwards Todd. 12mo, pp. 377. New York: William Wood & Co.

The primary object of this well filled volume was to enable seedsmen, of whom the author was one, to afford instruction at a trifling cost to such customers as had not a regular gardener, and thereby save themselves from the injury involved in a mismanagement of their seeds. The objects of the buyer and planter of seeds will naturally be promoted by the same means in like measure.

EXTENSION NOTICES.

Sherburne C. Blodgett, of Bridgeboro', New Jersey, having petitioned for the extension of a patent granted to him the 3d day of January, 1854, Antedated July 8d, 1853, for an improvement in hemming and cording umbrella covers, for seven years from the expiration of said patent, which takes place on the 3d day of July, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 10th day of June next.

George Sharp, of Philadelphia, Penn., having petitioned for the extension of a patent granted to him the 5th day of Jan., 1854, for an improvement in design for spoon handles for seven years from the expiration of said patent, which takes place on the 5th day of July, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 10th day of June next.

Edmund Munson, of Utica, N. Y., having petitioned for the extension of a patent granted to him the 19th day of July, 1853, for an improvement in eyes for mill stones, for seven years from the expiration of said patent, which takes place on the 19th day of July, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 1st day of July next.

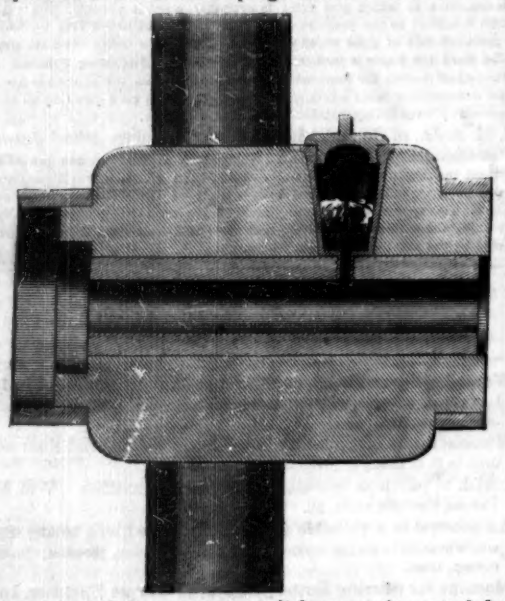
William Mann, of Philadelphia, Penn., having petitioned for the extension of a patent granted to him January 11, 1853, and Antedated July 11, 1853, for an improvement in manufacturing copying paper, for seven years from the expiration of said patent, which took place on the 11th day of July, 1860, and this application having been authorized by Act of Congress, it is ordered that the said petition be heard at the Patent Office on Monday, the 10th day of June next.

Benjamin Irving, of New York City, having petitioned for the extension of a patent granted to him, August 30, 1853, for an improvement in steam boilers, for seven years from the expiration of said patent, which takes place on the 30th day of August, 1867, it is ordered that the said petition be heard at the Patent Office on Monday the 19th day of August next.

MORRIS' AXLE LUBRICATOR.

The engraving represents a longitudinal section of a wheel hub with an improved lubricating tube inserted. It is the subject of a patent granted through the Scientific American Patent Agency to Jacob F. Morris of Lansingburgh, N. Y., Feb. 12, 1867. A brief description will explain its construction.

It is a conical case of metal having a hollow threaded stud at the bottom which screws into a tapped hole in the iron sleve of the hub, thus securing it firmly. The top of the case is octagonal to permit a wrench to be used for seating it into the hub, and it stands flush with the outside. Inside the reservoir is a perforated cup-like strainer held in place by a wire secured in its center and bearing against the inside of the cap. On this strainer is a sponge and the reservoir being



filled with oil the sponge prevents it from running out of the little pipe at the bottom when the carriage is at rest. When in motion the jars and jolts serve to squeeze the sponge and allow the escape of the oil to the axle. The vehicle may be run for weeks with once filling the reservoir. The only projecting part is the cap, which is ornamental and stands but slightly above the hub.

This device is applicable to all sorts of vehicles, pleasure carriages, wagons, trucks, etc., and adapted to the object sought. For rights and for further information address Morris & Lochrow, Lansingburgh, N. Y.

MAN AND NATURE.

Matured science is a critical expounder of revelation. It corrects many crude notions of the meaning of the inspired writings, and wherever it bears upon them unfolds a sublimity of enlarged significance in the words, which deepens our reverence and wonder. Geology first taught man to read the story of the Creation in its magnificence, and with the sister sciences will doubtless carry daylight through many deep, dark passages yet unexplored. In like manner the triumphant progress of chemistry for the last twenty years has thrown a new meaning into the commission of man from the Almighty, to "replenish the earth and subdue it."

We supposed that we were to wrestle with the elements and forces around us, to utilize or counteract them by our ingenuity, and to achieve an external supremacy over the tributary yet foreign dominions of Nature. It was considered until lately impossible to invade these dominions and take the work of Nature out of her hands. But since this has been done, by the chemical fabrication of organic products such as glycerin, grape sugar, alcohol etc., the barrier has been broken, and probability points further than we dare speculate toward a conquest of the internal administration of nature by man.

Not that such human administration of nature should be necessarily in the old forms; although every plant and creature domesticated by man receives from him a preternatural development, and the secret processes of organic life itself are yielding gradually to man's understanding and control. But the work now opening before us in chemistry appears almost as free and limitless as the combinations of thought and language. A given number of elements will "spell" many more new combinations than the same number of letters. Numerous as are the substances existing in nature, to the long catalogue of which new additions are made daily, the chemical permutations of which the elementary substances are capable by fresh grouping, are practically infinite, and may yet eclipse the corresponding productions of nature (as in some cases they already do) in brilliancy and value as well as in multitude. The rapid development of laws and possibilities for the combination of new substances with all imaginable or unimaginable properties and powers, looks to a New Nature yet to be evolved by man as the rational soul of the world—a nature transcending the old, as the soul transcends the clod, and for which the whole prior development was but a provisional foothold.

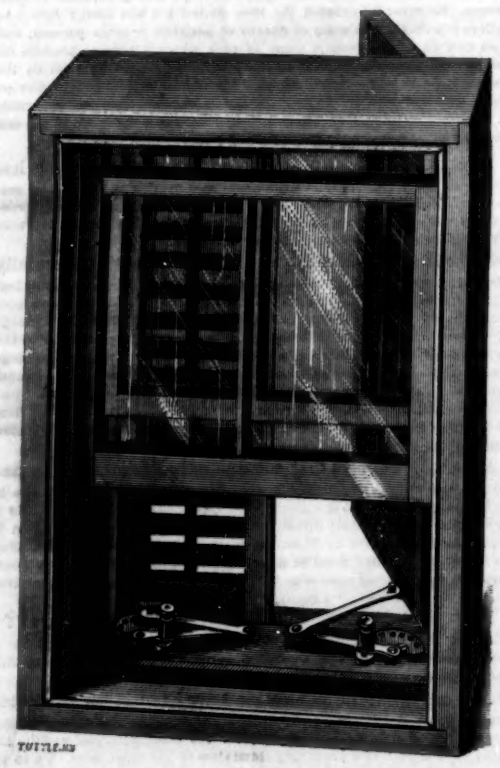
And why not, when we read man's commission from the lips of his Maker, as the vice-gerent of God? Who dare assert that the commission to "subdue" this universe has but a superficial and deceptive sense, leaving Nature still supreme in the interior realm of vital powers, and man, as he really has been, her dependent and her slave? It seems rather, as if God in the six scenic days of creation had but prepared the embryo of the universe to receive its soul, and having thrown Man into the organism prepared, rested from the work and left it to one in His image and his stead. "My Father," said the Second Adam, "worketh hitherto, and [now in the Sabbath] I work."

Nutrition and Physical Power.

Careful and exhaustive experiments upon muscular action by Dr. Frankland, have led to the conclusion that animal mechanical power is principally generated, not as has been supposed, by oxidation of the muscles, or of the nitrogenous constituents of food, but by the non-nitrogenous elements, sugar, fat, starch, etc., through the medium of the blood. The blood is thus the true fuel for *both* the chief forms of force in living animals, viz. heat and mechanical power. The muscle is only a part of the machinery through which the force is utilized, and its waste and repair are analogous to those of the metallic parts of a steam engine. In Dr. Frankland's table, the theoretical force-producing capacities of the leading kinds of food are proportioned as follows: beef fat, 3,841; butter, 3,077; Cheshire cheese, 1,846; flour, 1,627; rice, 1,591; refined sugar, 1,418; yolk of eggs, 1,400; mackerel, 683; lean beef, 604; milk, 266; wheat bread, 910; potatoes, 423. The cost of the same articles for a given amount of work will be in the following proportions: beef fat, 550; butter, 1,250; Cheshire cheese, 1,150; flour, 375; rice, 550; refined sugar, 1,500; eggs, 1,450; mackerel, 2,500; lean beef, 4,250; milk, 4,050; bread 475; potatoes, 525. Thus it will be seen that the most nutritious varieties of food are by no means the most economical sources of physical power, and it should also be remembered that the value of any food is even more dependent upon its fitness for the individual, than upon its richness. After all investigation, therefore, the primitive dictates of nature in the appetite, provided that has been kept healthy and sufficiently enlarged by experience, are the best rules we can obtain for diet.

WING AND BRADEEN' BLIND FASTENER.

It is a bother, and sometimes a danger, especially if the window sill is low, to unfasten a thrown back blind in order to close it. There is no reason why some simple arrangement cannot be placed inside the room for this purpose. And, then, it is not unfrequent that the blind, secured in a partially opened position, would give an agreable shade while admitting all the air. The device shown in the engraving secures both these objects.



Two jointed levers are arranged as seen in the engraving, the outer end of one attached to a pivot plate on the blind and the inner end of the other to a semi-circular plate on the window sill. The other ends are pivoted together. This semi-circular plate has holes near its edge in which a spring bolt on the inner arm catches. This bolt is lifted by its head and held as the blind is pushed open, until the blind is in the position desired, when, by releasing it, the spiral spring in the bolt case throws it into a hole, firmly securing the blind. It will be seen that this locks the blind, not only when thrown entirely back and when closed, but, also, when at any point between these two positions. Its operation can be easily comprehended by reference to the engraving.

A device is also shown for holding the slats in any position. It is simply two arms attached to the connecting rod, one of which, by a cylindrical bent arm, is held in a sleeve clamp of sheet metal fastened to the lower frame of the blind. The apparatus, being of brass, white metal, or silvered, is ornamental as well as useful.

It was patented through the Scientific American Patent Agency, January 23, 1867, by Wing & Bradeen, who may be addressed for state, county, or manufacturer's rights, or for samples, at the corner of Johnson street and Railroad avenue, Newark, N. J. The States of New York, New Jersey and Pennsylvania are already sold.

OSBOURNE AND MASSEY'S IMPROVED HOSE COUPLING.

There have been a number of attempts to improve upon the ordinary method of connecting the ends of hose for fire, locomotive, and other purposes, some of which have been more or less successful, but none of which that we have examined have combined so many advantages as the one shown in the accompanying engravings. We do not hesitate to commend it for simplicity, quickness of connection, and closeness of joint. A description of reference to the parts will enable any one to understand its construction and operation. Fig. 1 is a perspective and Fig. 2 a sectional view of the coupling both showing it as closed.

The part, A, has on its outer end a projecting head having, for one-half of its circumference, a lip, B, with an inside circumferential groove to receive the collar, C, on the other part

Fig. 1

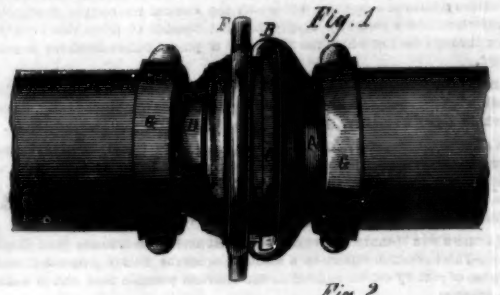
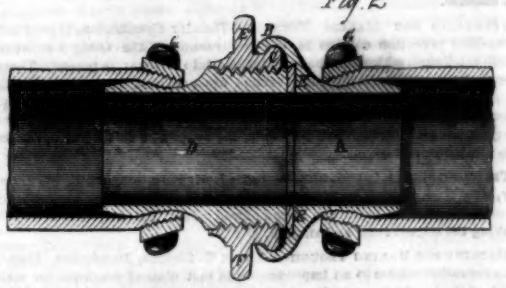


Fig. 2



of the coupling. This collar is connected with the part, D, by a left hand thread on its inner surface, engaging with a corresponding thread on the outside of the part, D. A recess inside the head, B, receives an annular packing of leather or other suitable material, seen in section at E. The collar, C, is provided with snugs, F, by which it is turned, either with the hand or a common hose wrench. The force of the hand, however, is in all cases sufficient to make a perfect joint.

Now if the collar, C, is turned so that its face is flush with that of the pipe, D, on which it turns, and it be dropped into the recess of B, a slight turn of the lugs, F, to the right will advance the pipe, D, and make a perfect joint between the collar and the packing. The joint can be thus instantly formed, or the hose disconnected without turning or twisting the hose, and it can be done by one person.

The connection of the leather, rubber, or canvas hose with the metallic pipes is almost as quickly made. It will be observed that the parts, A and D, are somewhat reduced in external diameter. The hose is slipped over the ends of the pipes and secured by the screw collars, G, whose inner surfaces are dished or inclined to correspond with the bevel of the pipes.

It is obvious that this device can be applied to any case where flexible hose and metallic pipes are to be united. It is certain there is no exposed screw thread to be injured by contact with the pavement and that the hose can be kept untwisted.

This device is the subject of a patent issued to Wm. J. Osbourne and G. B. Massey, of New York city, March 5, 1867. For additional information in regard to it address Cooper, Jones, and Cadbury, Philadelphia, Pa., or Massey, Shaffer & Co., 68 Broadway, New York city.

New Mode of Glass Engraving.

We are indebted to Judge Paschal, of this city (late of Texas), for specimens of window glass engraved by a process patented by C. C. Stremme, of Austin. The process consists in forming the design upon ground glass with glue or other strongly adhesive and contractile paste, which in contracting detaches laminæ of irregular shape and thickness from the surface of the glass, and leaves the design wrought in a style of peculiar beauty, resembling hard frostwork. The design in glue may be formed by means of a stencil plate, and the work thus executed as rapidly as the brands on packing boxes, etc. Or, if the design be too complex to be stencilled in a satisfactory manner, the drawing or print to be copied may be laid under the glass and traced in *fac simile* with a lead pencil, after which the lights within and around the design may be covered with a protecting varnish and the glue then applied to the shades, giving the picture in frostwork; or the shades may be protected and the lights may be etched, leaving the picture in ground glass, set in frostwork. It will be seen that the requisite apparatus and skill are within the reach of every one. Glass ware may thus be very chastely marked with the name or cipher of the owner, as readily as linen.

Try It.—A correspondent of *The Country Gentleman* asserts that red cedar twigs bound around the bodies of fruit trees, butts upward, will effectually protect the trees from insects. And if fruit trees, why not shade trees? Col. Dewey of Hartford writes to *The Horticulturist* that in his vineyard, grapes trained upon red cedar posts and trellices are free from mildew and insects, and those growing closest to the posts have the most healthful appearance and are the most productive.

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VOL. XVI., No. 16....[NEW SERIES.]....*Twenty-first Year.*

NEW YORK, SATURDAY, APRIL 20, 1867.

Contents:

(Illustrated articles are marked with an asterisk.)

CAUTION.

It has become necessary for us to state very distinctly that the Scientific American Patent Agency Offices are at No 37 PARK Row, and not at No 39.

WHAT DO WE WORK FOR?

The question we desire briefly to discuss is not "*Why* do we work?" but "What do we work *for?*" Some may answer at once: "For money—wages or salaries." We do not think this is a correct and full reply to the question. Labor may be the Adamite curse, but if so, the innate desires of man and his restlessness and ambition for improvement have changed the curse to a positive blessing and made the earth—thorn and thistle cursed—to bloom and blossom like the rose. We work partly because we need it. We need it for health of mind as well as of body. Idleness leads to decay and decay to death. He who through years of active exertion leaves his employment and "retires from business" usually signs his death warrant. He vegetates for a while in idleness and dies, unless he has sense enough to discover his mistake in time and return to the paths of active usefulness. There are few more pitiable objects than the man who after many years active service in business is deluded into a belief that happiness and a reward for his labors are to be found in withdrawing from all participation in the work of life. Old age is an excuse for idleness, but the possession of money is not.

We do not work for money alone. The mechanic who would be content to do the work of an apprentice, merely because he could earn more wages, would be hardly worthy the name of mechanic. The amount of wages or salary is a recognition of ability and a standard of value for services performed, but not the only incentive to exertion. A workman feels a pride in his work—in the results of his skill—entirely unconnected with the amount of money received for it. If he did not one very strong motive for improvement would be lacking. Almost every mechanic will agree with us that he has done jobs which afforded him more gratification in their success than he derived from the possession of the pecuniary compensation therefor. How often a man will undertake a job which he knows beforehand will not "pay" in cash what it costs, but mainly for the pride of performing successfully. It is true that "the laborer is worthy of his hire," but to agree that the hire is the only, or even the principal incentive is unreasonable, not sustained by facts, and derogatory to the "dignity of labor," a phrase often misued but a perfectly correct one. To be sure, if the efforts of the workman—and by this term we mean all who *do*—are not appreciated by adequate compensation he seeks other employers who have a proper appreciation of his value.

We work for progress; for progress individually and for the progress of the race. One means to that progress is the payment for services rendered, as it will enable the skilful workman and the inventive mechanic to carry forward their plans of improvement in manual labor or in labor-saving machines. We work for the godlike pride of creation. The machine which is an offspring of the brain of the mechanic is as much, and more, his than that of his loins. If he is illy paid for his labor, mental or physical, he has the compensation of a satisfaction in his success which cannot be assured by money only, but which must be felt in the knowledge that he has succeeded where others failed, and has secured an impregnable position as one of the pioneers in the grand march of improvement.

There are few pursuits which demand more hard work—work of the brain—than that of the mechanic. In no sense can he be considered an exemplar of Bunyan's "Muckrake." He must live in order to work, but he does not work merely that he may live. He is always striving to mount the next step on the ladder, and never does he mount but that he carries with him the living, moving world. It is his pride to *excel*; never satisfied with mediocrity, but always striving for superiority. From the workman to the inventor is but a step—a long step it may be—yet not beyond his powers if he employs them properly; and the inventor, not a mechanic, is often dependent on the mechanic for the success of his improvement.

Now, as individual excellence depends largely on individual exertion, although aided somewhat by the recorded efforts and failures of others, it is obvious that associations which "raise" or bring down each individual to a common level as to compensation, must retard the improvement in mechanical science and practice so imperatively demanded by the increasing wants of the age. The associations, whether under the name of "trades unions" or "labor associations," have operated to bring the skillful workmen down to the level of the "botch," and not to elevate the half informed mechanic to their level. The incentive of money—wages received—has been the means used to give these associations power; and as the inferior workmen in all branches of industria' business greatly outnumber the finished mechanics, they, the inferior class, rule these societies. The effect is really a lowering of the status of the mechanic. One may do more and better work—more in quantity and better in quality—than another, but because the inferior workman is on an equality as to standing in the society or union, either the superior workman must submit to be undervalued, to his pecuniary loss and to his injury by depriving him of the laudable ambition of receiving a recognition of his superiority; or the employer is compelled to pay for inferior work the same amount for which superior work could be obtained. In either case it is unjust; in one case to the conscientious and careful workman and in the other to the employer.

The basis of these unions is wrong. They make the amount of wages, not the skill of the workmen, the basis of their demands. The amount of wages paid is not really the criterion of excellence, and under these union rules can never be made so; while if individuals were contracted with, the individual skill would become, as it should, the basis of compensation, and the pecuniary return for services rendered would incite to superior excellence and tend to the general advancement of the world.

NATURAL GAS SUPPLY FOR TOWNS.

The ancient mariners of Lake Erie gratefully remember the Portland light at Barcelona harbor, for it was the largest and brightest light on the lakes and was never known to fail. The light cost less than any other beacon light in the world for it came from the burning of gas which rose up spontaneously out of the ground. The gas was of the best quality and the supply was apparently inexhaustible. There was many times more than was needed or used and for aught we know it was burned during all the day. But the Portland light is now no more, at least for the sailors; the gas now sheds its cheerful beams only on the land lubbers of the village of Westfield.

When the state line railroad was completed, the harbor of Barcelona, which at Westfield, N. Y., was distant from it only a mile, was abandoned and the Portland light was not needed. The gas was wasted on the desert air. Last summer Addison Crosby and D. H. Taylor, under the name of the Westfield Gas Co., having secured a title to the gas brought it to the village of Westfield, a distance of one and a quarter miles.

At the gas spring a pit was dug in the rock five feet in depth and sixteen feet in diameter to accomodate a gasometer of the same dimensions. From the top of this a main was laid to the Westfield gasometer which last has a capacity of 8,000 cubic feet. From the first to the second gas holder there is a gradual ascent of 180 feet and as the gas is lighter than air it travels up without any assistance from pumps. The pressure at the upper holder is nine tenths and at the spring one and a half tenths of an inch water pressure. The supply of gas is so abundant that early in the day the upper holder is filled and is never exhausted at night. The Company have at command three times as much gas as they use and they propose shortly to offer it for fuel as well as light. The gas is in use all over the village, and in all there are 2,000 burners. The villagers pay $4 per 1,000 cubic feet, a good remuneration for the enterprise of the gas proprietors. The stock of the company must be above par. The good people of Westfield ought to be happy and proud. They have one of the most prized luxuries of the cities without any nuisance or danger of gas works.

Fredonia, a neighboring village, has had the prestige for about half a century of getting its light from natural gas, but it must now yield the palm to Westfield. In fact Fredonia never deserved its great renown, for until within a few years the natural gas supplied less than a score of burners, and it was of poor quality. At the present time it depends mainly on its new coal gas works, where a little natural gas is mixed with a large percentage of coal gas. The charge of the company for the mixed gases is $6 per one thousand cubic feet. The Westfield natural gas is said to be richer than the gas of cities in about the ratio of three to two.

THE GREAT OBSTACLE TO PROGRESS.

A condition of ultimate progress more essential than all others, yet little considered by men, is the suppression of moral and social evil. We can never get on while we are discordant and selfish. Capital and labor can never succeed at sword's points. The selfishness of rival interests inexorably bars improvements the most practicable and important. The corruption of politics paralyses government for the great public works that properly belong to it, and the richest commonwealth is glad to borrow from Shylock corporations, on their own terms, the use of roads, bridges or supplementary streets which it needs and ought to own. Nor can we have them even thus: the multitude of Shylocks contending for the prey, and each determined that if he cannot succeed no other shall, is what prevents the construction alike of the Under Broadway and the Upper Broadway and the Back Broadway and the Tubular Ferries. And so it goes everywhere. The strength of union has never been tried. The strength of innocence and loyalty has hardly been thought of. And we may be as sure as we are that there is a good Providence over us, that the power of man will never be suffered too greatly to exceed his fitness for the trust of power. Even without overruling, the natural workings of depravity set limits to the advancement of its own resources. If real union were possible for selfishness and sin, the power man might attain thereby would surpass the wildest dreams of imagination; but it would be a formidable power, and most formidable to itself. The power of a regenerated and united humanity for good, when it comes, will be limitable only by the capacity of its sphere.

A TERRIBLE INVENTION.

It must seem to many of our readers singular and superfluous to occupy valuable space from time to time in pointing out the absurdity of perpetual-motion and power-multiplying machines. If the amount of costly infatuation on these subjects with which we are brought in contact in our patent business could be believed, it would not seem strange that we are prompted to reiterated efforts to prevent what is so hard to cure. If the value of the wasted lives and misdirected ingenuity that are still applied to the solution of problems that involve a contradiction in terms could be realized, it would justify "line upon line, precept upon precept, here a little and there a little," to persuade men to use their reason instead of letting fancy fly away with them.

Bear for a moment with an unfortunate inventor who says of his discovery:

> This machine consists in a combination of toggle joints and levers. The action of toggle joints differs greatly from that of the lever. While the laws of leverage show always a loss of space and speed against a gain in power toggle joints on the contrary show a gain in power besides a gain in space and no loss in speed, provided all parts be in the proper proportion. Toggle joints act with rapidly increasing force until the bars form a straight line and for that reason—by a certain arrangement of compound leverage, toggle joints and levers—any machine constructed according to the same principles as the one on exhibition, will increase its moving force 8 times, with a gain in space of ⅛, and no loss in speed.

The machine referred to is a small model worked by air compressed into two steam-engine cylinders by muscular power. The motion of the pistons is transmitted through a complicated mechanism until it results in the rotary motion of a fly-wheel and pulley. It will be seen from the words quoted that the inventor thinks the pulley will do eight times more work than the compressed air or the arm that compressed it. That is, supposing the work of one man be required to compress the air, the pulley, if connected with further machinery, will do the work of eight men, or about one horse-power.

Suppose we grant this to be true. Then let us apply this one horse-power to compress air for a machine of exactly the same construction but eight times larger, and we shall obtain eight horse-power, and we may construct a third machine of the same kind but eight times larger than the second and multiply the power to sixty-four horse-power, and by a fourth machine to five hundred and twelve horse-power, which we may apply to a pair of paddle wheels to drive a two-thousand-tun steamer across the ocean, and all that by the power of but two men, one working while the other sleeps!

To make a further illustration: as power may be converted into heat by friction, we may heat our houses in winter with hot air by means of a fifty-horse engine on the above plan, driven by a squirrel in a rotary cage. Nay, we need not make a slave of the poor squirrel, for we may by means of a strap apply a minute part of the fifty horse-power to do the work for him. The only serious objection to the latter plan is that if the strap were to transfer a little too much power, the fifty horse-power would very soon rise to one hundred, and in turn make the strap work stronger still, so that the power of the engine might go on increasing in a geometric proportion until the whole concern would fly to pieces with a disastrous explosion.

This strictly logical *reductio ad absurdum* is applicable to every contrivance, however plausible it may look to the inventor, which assumes to make machinery exceed (or even equal) in work the power applied to it—in other words, generate force, or in still other words, supply perpetual and self-caused motion. A machine generating force in excess of that provided to impel it, if such a thing were possible, could never be stopped by the power that started it, and would become, like the wonderful self-acting cork leg in the song, the master and not the servant of its maker.

M. DAUBRÉE has effected the decomposition of feldspar by rapid rotation in a cylindrical vessel with distilled water. The water became alkaline and he was enabled to separate considerable quantities of potash or soda, according to the rock operated on. If the process be practible on an industrial scale, its importance is obvious. In a scientific point of view, the principle developed is very interesting, and may open the way for varied investigations. M. Daubrèe queries whether decomposition as well as mechanical disintegration of rock may not be produced by the motion of the sea.

THE CENTAL SYSTEM of measuring grain (by the hundred pounds) has fallen through for the present, Boards of Trade in the great grain markets except Chicago, having generally declined to adopt it.

ISSUED FROM THE U. S. PATENT OFFICE,

FOR THE WEEK ENDING APRIL 2, 1867.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the SCIENTIFIC AMERICAN, New York.

63,354.—GRATE FOR FURNACE.—Hawley Adams, Stamford, Conn., assignor to himself and W. H. Cobanks and H. Theall, New York City.

I claim a grate for furnaces having its bars, B, extending diagonally across the grate-frame in an unbroken line, in the manner herein set forth.

63,355.—SMUT MACHINE.—Z. G. Allen and G. W. Marshall, Buffalo, N. Y. Antedated March 18, 1867.

First, We claim the combination of the upper and lower concaves, H K, the former of lesser diameter, with the beaters, D D, or their equivalent, when arranged and operating in the manner specified.

Second, We also claim the adjustable beater slats, D D, in combination with the concave formed of the obliquely corrugated iron plates or sections, I I and J J, substantially as described.

Third, We also claim, in combination with the fan, E, and beater shaft, B, the spiral wings, o o, operating substantially for the purposes described.

63,356.—TONGS AND WRENCH.—John N. Arvin, Valparaiso, Ind.

I claim the arrangement and combination of the levers, A B, straps, C, spring, D, jaws, O P, and shank, m, when constructed substantially as and for the purpose specified.

63,357.—HORSE-YOKE HARNESS.—B. F. Baker, Milton, N. Y.

First, I claim so constructing and applying a horse-yoke harness that the pressure or draft is brought evenly upon the shoulders or breast of the horse or horses instead of upon the upper part of their necks, substantially as described and shown.

Second, The suspension of the bow or bows in a nearly horizontal position from the name or collar by the means substantially as described and for the purpose set forth.

Third, The diagonal or oblique backstraps or tugs, with one of their ends attached to the name or collar, and their other ends attached to the extremities of the bows, substantially as described.

Fourth, The central draft chain and short tugs, in combination with the bows and evener, applied substantially as described, for the purpose set forth.

63,358.—RUNNING GEAR OF LAND CARRIAGES.—John Blocher, Buffalo, N. Y.

I claim, in combination with the revolving wheel shafts, a, and axle, d, the clip, c, and collar, f, and nut, i, arranged and operating substantially in the manner and for the purposes set forth.

63,359.—LANTERN.—Eliam Boorse, Philadelphia, Penn.

I claim the guards, D D, when adapted to constitute springs to retain the chimney or globe upon the base, A, substantially as described.

63,360.—MILL-STONE DRESS.—D. Bowman, Knoxville, Tenn. Antedated March 28, 1867.

I claim the mill-stone dress herein described, the same consisting of the upper stone having deep square-edged channels in the back, and feathered to the front side, and the lower stone, with broad equally shallow furrows throughout, and narrow lands, substantially as described, for the purpose specified.

63,361.—DISH PAN AND DRAINER.—Fred'k Bucknam, Portland, Me.

I claim the combination with the pan, A, constructed as described, of the slide drainer, c, having the rack, e, all arranged and operating as and for the purposes set forth.

63,362.—PORTABLE FENCE.—Belus Calkins and Veranus Calkins, Varysburg, N. Y., assignors to themselves and Otis Kimball and Joseph Forsyth, Buffalo, N. Y.

First, We claim a portable fence, made in sections, constructed in the manner and substantially as herein described.

Second, The combination and arrangement of the hinged brace bars, D D, and stakes, E E, forming a portable brace for fences, constructed and adjusted in the manner substantially as herein set forth.

Third, The combination and arrangement of the foundation posts, B, folding fence, A A', top and bottom connecting bars, F and B', and adjustable braces, D E, in the manner and substantially as herein described.

63,363.—FARM GATE.—J. Campbell and A. D. Krewson, Harrison, Ohio.

We claim, First, The curved tongue or latch, a, in combination with the elevated platform on which it rests, approached by the inclined planes on one or both sides, as and for the purpose set forth.

Second, The same in combination with the drop latch, D, boxed into post, C, and sliding perpendicularly therein, as set forth.

Third, The elements of the first claim, in combination with the screw-threaded and tapped shank, H, of the eye of hinge, b, forming a brace rod by which the gate may be strained up should it sag.

Fourth, The provision of the dogs, w w', for holding the gate in an open position.

63,364.—MACHINE FOR MAKING SCREWS.—John Cochrane, Wall Township, N. J. Antedated March 24, 1867.

I claim, First, The combination with each other of two rolls or revolving dies, having projecting threads of proper form and arrangement upon their peripheries, to produce the required screw upon the heated blanks, and working at the proper angle for the production of such screws, and having a dentated portion of reduced radius in the periphery of either or both of said rolls or revolving dies so as to permit the introduction of the blank bolts between them at the proper moment in each revolution, substantially as herein described.

Second, The combination with each other of two revolving rolls or dies, having the threaded portion of the periphery of either or both of them so formed or shaped as to produce, at each revolution, a screw of uniform diameter, or tapering or gimlet pointed, as may be required, constructed and operating substantially as herein described.

Third, The combination with each other of two rolls or revolving dies, having annular threads or portions thereof upon their peripheries, of suitable form for making screws upon blanks and mounted upon axles or spindles that are so inclined to the axis of the bolt upon which the screw is to be formed as to make such annular threads conform to the angle of such required screw, whether such rolls are mounted on axles, stationary bearings, or upon bearings that are so constructed and operated as to give a lateral movement to the rolls or revolving dies, to and from each other during the progress of the work as required in receiving the blank, and in making a screw thereon, or for imparting to the screw a uniform diameter, or a tapering or gimlet-pointed form, substantially as herein described.

63,365.—APPARATUS FOR CONCENTRATING AND CONDENSING VOLATILE METALLIC SUBSTANCES.—Joseph C. Coult, San Francisco, Cal.

I claim, First, The arrangement of the furnace, having fire on two sides, and the openings leading to the ore chamber, substantially as described and for the purposes set forth.

Second, I claim the soot and spark chamber and the dry compartments, having a continuous supply of cold water surrounding them to hasten condensation and concentration of volatile mineral substances, as described substantially and for the purpose set forth.

Third, The combined arrangement, broadly, as an improvement upon the Coult and Roach concentrator and condenser, for the reduction of quicksilver ores, and the use of steam or water to produce draft to accomplish all, substantially as in the specification described and for the purposes therein set forth.

63,366.—HOOP SKIRT.—Charles Daniels, Birmingham, Conn.

I claim the combination of the fabricated part, B, with the hoops below, when made adjustable, substantially in the manner specified.

63,367.—ROOFING CEMENT.—Joseph Darby (assignor to himself, Stephen Brewer, and Wm. W. Winter), Cortlandville, N. Y.

I claim, as a cement for roofs, walks, and other surfaces, the herein described composition of matter.

63,368.—STEAM-ENGINE VALVE.—F. W. Davidson, Cleveland, Ohio.

I claim the arrangement of the valves, D and E, with reference to each other and the arrangement of the ingress and egress steam passages upon the principle and in the manner as herein set forth.

63,369.—METHOD OF MAKING PLOWS.—John Deere (assignor to Deere & Co.), Moline, Ill.

I claim, First, The welding brace, A, constructed and arranged for use in the construction of plows, substantially as and for the purpose set forth.

Second, The templet or test plate, T, when constructed and adapted for use in the manufacture of plows, substantially as set forth.

63,370.—GATE.—Daniel A. Denison, Troy, Mich.

I claim, First, A gate latch formed by duplicate hooks, C, attached to common shank, C', operating simultaneously on both sides of the gate, substantially as set forth.

Second, The combination of the sliding gates, A A', double posts, B, rollers, B', latch, C, and eyes, D, substantially as set forth.

63,371.—ROOFING.—Drake W. Denton, Ithaca, N. Y.

First, I claim the use of wood-fiber matting, or other cushioning, padding, or matting material, not woven, made into paper, nor felting, when used for the purpose of separating the roofing material from the roof-board, and thus making the coal-tar roofing independent of the variations of the board, by swelling and shrinkage, as described.

Second, I do not claim the mere use in roofing of hydraulic lime, but I do claim its use, substantially in the proportions herein described, for the purpose of so drying and convenient roofing material or mixture with coal tar, so that it shall prevent the flowing, settling, or sliding down of the coal-tar roofing as described.

63,372.—LOOM TEMPLES.—Warren W. Dutcher, Milford, Mass.

I claim as my improvement the combination as well as the arrangement of the disks or sections, b, with a series of arms, d, to extend from them, substantially in manner and for the purpose of supporting them when together or in their proper relations to each other and the toothed wheels, as set forth.

I also claim the application of each arm or wheel-carrier section to that, or the end support next to it, so that they shall so interlay or interlock with and support one another as to prevent one from being revolved or turned on their connection rod independently of the other when they are close together thereon, as described.

I also claim each of the said arms, as constructed, with the aperture for receiving the supporting rod.

I also claim the arrangement of the supporting rod with respect to the arms and the end supporters, *viz:* so as to go through all of them and aid in fastening them together as explained.

I also claim each disk or divisional plate as made with a wheel-receiving recess, l, and journal, c, arranged in it as set forth.

63,373.—MACHINE FOR SEPARATING FIBROUS SUBSTANCES FROM THE SEED.—Alfred B. Ely, Newton, Mass.

First, An elastic roll in combination with a concave grating, E, substantially as described.

Second, An elastic roll, substantially as described, in combination with flat plates, a b c d, etc., whether one or more, and whether with plain or serrated edges, when arranged and operating substantially as set forth.

Third, An elastic roll, substantially as described, in combination with hard rolls, B C, or either of them, and whether smooth or corrugated, when arranged and operating substantially as set forth.

Fourth, An elastic roll in combination with flat plates, a b c d, etc., whether one or more, and whether plain or serrated, and hard rolls, B C, or either of them, whether smooth or corrugated, arranged and operating, substantially as described.

63,374.—MALT DRYING APPARATUS.—H. A. Engels, C. H. Engels, and John Wieland, San Francisco, Cal.

First. I claim the mode of malt drying in which the grains are mechanically carried into and spread about the kiln, then therein turned and propelled by rakes, and at the same time submitted to a current of hot air, combined with the heat of steam pipes, in a manner substantially as described above.

Second, The combination and arrangement of elevator, h, worm, p, picking shaft, q, kilns, i, rakes, b, shafts, r r, funnels, a and d d, steam pipes, k k, hot-air pipes, l n n o o, flue, m, and chute, e f, in a manner and for the purpose described.

63,375.—STEAM GENERATOR.—Lewis Fagin, Cincinnati, Ohio.

I claim the arrangement of either cylinder or tubular boilers, one under the other with the flue spaces between them arranged so that heated air shall pass under and between each successive tier, alternately from the upper to the lower, the tubes or boilers being connected by vertical necks and transverse tubes, D, as described, and for the purpose set forth.

63,376.—ILLUMINATING BURNING FLUID.—Lorenzo D. Ferguson, Corning, N. Y.

I claim a carbonized benzine fluid for illuminating purposes compounded of the ingredients or equivalents in the proportions, substantially as described.

63,377.—PLOW.—Josiah Fish, Smelser, Wis.

I claim the plate connecting the tongue and beam, marked fig. 1, together with the plate attaching my team to the plow, and bars that my plows are attached to for the uses as set forth in my description and specification.

63,378.—BROAD-CAST SOWERS.—F. G. Floyd and E. A. Floyd, Macomb, Ill.

First, I claim the revolving disk, d, provided with the radial flanges, h, having their outer ends projecting beyond the periphery of the disk and curved in the manner shown, substantially as set forth.

Second, The combination of the frame, a, hopper, b, slide, i, and revolving disk, d, constructed as above set forth, all arranged for joint operation as herein described.

63,379.—AXLE BOX.—Albert A. Freeman, Philadelphia, Pa.

I claim the V-shaped guides, B B, adapted to and combined with the hanger, A, and box, C, substantially in the manner and for the purpose described.

63,380.—ELECTRIC MAGNETIC ENGINE.—Charles J. B. Gaume, Davenport, Iowa.

I claim the arrangement of the wheels, F F, provided with the electro magnetic coils as described, with the wheel, E, provided with the duplicate set of iron plates, K, arranged radially as set forth, operating through the medium of the alternate battery connection and disconnection, substantially as described.

63,381.—PLOWS.—Jacob Hege, Shiloh, Ill.

First, I claim as a new article of manufacture, the plow, B, when formed of one single piece of metal, substantially as described and set forth.

Second, I claim the plow, B, when constructed with an excess of metal in that side of the mold board and share nearest the land side, substantially as described and set forth.

63,382.—HAY LOADER.—Wm. M. Hall and John Johnson, Barrington, N. Y.

I claim, First, The fork head, M, provided with the arched guide, m, in combination with the hinged clasps, N, having the cross bars, n, attached thereto, stem, O o', and socket, k, when the several parts are constructed and arranged to operate substantially as and for the purpose described.

Second, The detachable driving spur wheel, E, constructed and applied as described in combination with hollow crane post, B, provided with the hinged adjustable crane arm, C, and jointed arm, D, upon which is mounted the spool, G, and its driving pinion, the whole arranged and operating substantially as and for the purpose specified.

63,383.—BAG HOLDER.—O. Hanks, Cincinnati, Ohio.

I claim the side pieces, A A A A, the cross pieces, B B and C C, the pins or hooks, D D D D, the wheels or rollers, F F F F, the bolts or pins, E E, the whole being combined in the manner and for the purpose as herein set forth.

63,384.—CULTIVATOR.—George D. Hart, Lycoming county, Pa.

I claim the combination of the standards, A, attached to the plate, C, by hinge and standards, A', with its tenon at the upper end, as shown in fig. 1, with the blades or cutters, B, the plates, C, when provided with the slots, g, and the notches, h, and the frame or support, O, all constructed and arranged substantially as described and set forth.

63,385.—WIRE STAPLE.—Hayward A. Harvey, New York City.

I claim a staple with the legs thereof formed with protuberances and depressions, substantially as described.

63,386.—CURTAIN SUPPORT.—C. F. Herrick, Independence, Iowa.

I claim, First, The spring, P, points, a, and back piece, A', constructed and arranged and set forth in combination with the band, C, for the purpose specified.

Second, The strap, B, clamp d, roller, c, and band, C, arranged and operating as and for the purpose described.

63,387.—WELL TUBE.—P. J. Hershey, Clarence, N. Y.

I claim the shield, A, having fine slits, B, made therein for the entrance of water below the coarse or key slots in combination with the coarse or key slits, D', which are kept closed by the tube, C, in all the movements thereof in the shield, substantially as set forth.

63,388.—APPARATUS FOR MEASURING FLUID.—Jacob C. Horton, New York City and Samuel K. Hawkins, Lansingburgh, N. Y.

We claim, First, In combination with the measuring cylinder, reciprocating piston, the valves, a b c d, and oscillating cross bars, K, with arms, K', and connecting rods, L, we claim the reciprocating plate, C, with ledges and springs as described to operate the valves, all being constructed and arranged substantially in the manner set forth.

Second, In combination with a measuring cylinder and reciprocating piston, as described we claim an induction and eduction valve at each end of the cylinder so constructed and arranged that they will be automatically opened and closed by the movement of the piston in the order herein set forth whether described by the precise mechanism herein described or by any other equivalent mechanism.

Third, In combination with a measuring cylinder with induction and eduction valves as described and a reciprocating piston, we claim the reciprocating plate, C, with ledges and springs, substantially as described to operate the valves by means of any suitable connecting mechanism between said plate and the valves.

Fourth, We claim the reciprocating plate, C, with ledges and springs substantially as described as a means of operating valves to regulate the flow or passage of any kind of liquids or fluids whether in a meter or other machine to which the same may be applicable.

63,389.—FAN.—James L. Jackson, New York City, assignor to David N. Ropes, Orange, N. Y.

I claim the fan with its outer leaves, a a', connected to the adjacent leaves by straps, d, and the remaining leaves retained by straps, g g', whereby the outer leaves protect and enclose all the leaves when closed and form a handle for the fan when extended, substantially as represented and described.

63,390.—APPARATUS FOR SEPARATING SUGAR.—Gustavus A. Jasper, Charlestown, Mass.

I claim the arrangement of chutes, sieves, discharging spouts, and mechanism for operating such sieves substantially as described.

63,391.—CONDENSER.—W. Jeggle and L. A. Brooks, Chicago, Ill.

We claim the arrangement and combination of the cones, A C D E, pipes, H K and F, when the whole is constructed substantially as and for the purpose set forth.

63,392.—BORING BIT.—Melvin Jincks, Danville, N. Y.

I claim the shank, A, as constructed in combination with the gage, f, cutter, g, marker, e, and an adjustable bit, substantially as and for the purpose described.

63,393.—CLOTHES PIN.—Charles C. Johnson, Springfield, Vt.

I claim the metallic eyelet hinge connection made and applied to the two levers of the clothes pin, substantially as described.

63,394.—COLLECTING GOLD FROM RIVER BOTTOMS.—John Johnson, Saco, Me.

I claim the system herein set forth for the recovering of gold from the beds of rivers.

63,395.—STOVEPIPE DAMPER.—Ernst Kabisius, Davenport, Iowa.

First, I claim the form of the valve, B and C, with the scraper, E, attached to clean the inside of cylinder, F.

Second, The scraper, D, attached to cylinder, F, for cleaning outside of valve, B.

Third, The damper drum as a radiator and damper combined, all as herein set forth.

63,396.—FAN.—Frederick Koppenfels and Gustav Brueck, New York City.

We claim the combined fan and perfumed sachet constructed as specified, as a new article of manufacture.

63,397.—CLOTHES STICK.—Christian Kuder, Rochester, N. Y.

I claim as a new article of manufacture, the laundry, or clothes stick, S, constructed substantially as herein shown and described, with the ring, or rim, r, and hooks or points, i, for the purposes set forth.

63,398.—SHEARING AND PUNCHING MACHINE.—Isaac Lamplugh, Peoria, Ill.

I claim the improved combined punching and shearing machine, constructed and operating substantially in the manner and for the purposes described.

63,399.—FERRULE FOR BOILER TUBES.—Elbridge Lawton, New York City, Thomas J. Jones Summit, N. J., assignors to C. J. Eames, New York City.

We claim, In stopping boiler tubes the use of a ferrule, c, with projections a a, when attached to the tubes by means of a screw cut upon its surface so that the tubes themselves shall be made to answer the purpose of stays or braces for the tube sheet, substantially as above represented and set forth.

63,400.—PETROLEUM STOVE.—Joel Lee, Galesburgh, Ill.

I claim, First, Packing the conducting tube with wood in the manner and for the purpose set forth.

Second, A gas generator made of a coiled tube to encircle the jet of gas, the lower point being turned so as to allow the gas to flow through the center of the circle and burn against the bottom of the cooking vessel substantially as set forth.

63,401.—CORN PLANTER.—Noyes Liddell, Lafayette, N. Y.

I claim the hopper, A, seeding cylinder, B, cup, C, lever, O, with its attached gear wheels the harrow, F, tooth, D, cover, G, and roller, H, when constructed arranged, and operating as and for the purpose specified.

63,402.—WASHING MACHINE.—W. N. Lockwood, Woodcock, Pa.

I claim the levers, H, springs, J K, links, G, and rollers, E, in combination with the roller, L, arms, C, and slotted stays, D, arranged in the manner and operating conjointly substantially as and for the purpose set forth.

63,403.—MACHINE FOR BENDING BARS OF METAL.—Obed Long, Joliet, Ill.

I claim, First, The lever, k, with the friction roller, l, combined with the slotted plates, n n, constructed as and for the purposes described.

Second, The use of the trip, c, and the weight, b, with the crank shaft, d, and the connecting rods, c c, constructed and arranged for the purpose of operating the head block as described.

Third, The adjustable former, h, in combination with the nipple, m, and the gage, j.

Fourth, A combination of all the parts described substantially as and for the purpose set forth.

63,404.—APPARATUS FOR THE MANUFACTURE OF ICE.—T. S. C. Lowe, New York City.

First. I claim the expansion chamber, G, in an apparatus for manufacturing ice by artificial process when constructed with fixed freezers, G', around and in immediate contact with which the cold gas or vapor circulated, substantially as described.

Second, In such an apparatus fixed freezer's G1, in combination with plungers, G2, arranged to operate substantially as and for the purpose set forth.

Third, The elastic stoppers, G4, when used for the purpose and substantially as set forth.

Fourth, The combination of fixed freezers, G', elastic stoppers, G4, and falling doors, G3, or their equivalents, substantially as and for the purpose set forth.

Fifth, In combination with the expansion chamber, G, the eduction pipe, I, and water tanks, H, enclosing the same for the utilization of the cold gas or vapor passing from the expansion chamber so as to reduce the temperature of the water before entering the freezers, substantially as set forth.

63,405.—APPARATUS FOR CONDENSING CARBONIC ACID AND FOR DRAWING OFF AND APPLYING THE SAME FOR COOLING AND FREEZING.—T. S. C. Lowe, New York City.

First, I claim so arranging and operating an apparatus for condensing and retaining under pressure in the form of a liquid, substances which in their normal state are gases, that the heat generated in condensation, shall be taken up by the water in a cooler, C, and the liquid be condensed in a condenser, E', which is maintained at a temperature below that of the cooler.

Second, In such an apparatus the combination of a condensing pump, B, cooler, C, dryer, D, and the condenser, E', substantially as set forth.

Third, The mode substantially as set forth of inducing the flow of the liquified product of condensation from the condenser, E', into a gage, F', or their receiver.

Fourth, The mode substantially as set forth of regulating the temperature of the expansion chamber by pipes, F, leading thereto connected respectively with the upper and lower parts of the condenser, E'.

Fifth, The combination of the condenser, E', pipe, F, gage, F', and expansion chamber, G, substantially as and for the purpose set forth.

63,406.—BREAD CUTTER.—John Madden, Cleveland, Ohio.

I claim the slide, B, hand piece, b, and guard, F, in combination with the way, A', knives, C C', and side piece, E, substantially as and for the purpose set forth.

63,407.—MACHINE FOR SHARPENING SAWS.—Thomas T. Markland, Jr., Philadelphia, Pa.

First, I claim a reversible and portable rest, B, connected with the standard, C, adjusted by means of the set screws, j j, and arranged and operating substantially as described and for the purpose specified.

Second, The clamping disk, D, and clamping plate, E, when arranged in relation to the rest, B, and saw, F, substantially as and for the purpose set forth.

Third, The combination of the clamping board, P, with the rest, B, operating substantially as described and for the purpose specified.

Fourth, The combination of the shaft, J, having arms, q q, with the swivel plate, K, the said arms being adjusted by the set screws, u u, substantially as described and for the purpose specified.

Fifth, The slotted finger or catch strip, G, when arranged and operating in rotation to the saws, E and O, substantially as described.

63,408.—MACHINERY FOR MAKING ROPE.—Horace Mayson, Hopkinton, R. I., and Job Johnson, Brooklyn, N. Y.

First, We claim the traveling carriage, d, carrying the reversible head, g, and spindle, f, in combination with the spools, b, supplying yarn at each end of the rope walk, as and for the purposes set forth.

Second, We claim the shaft, e, and miter gearing, in combination with the spindles, f, and carriage, d, for twisting the strands in a rope walk as and for the purposes set forth.

Third, We claim the endless rope, h, and pulley, n, applied in the manner set forth, in combination with the traveling carriage, d, and spindles, f, substantially as specified.

Fourth, We claim the pulleys, 3 4 5 and 6, and ropes or belts and shaft, x, in combination with the clutch lever, 9, and pulleys, 7 and 8, for moving the carriage, d, in either direction, or allowing it to remain stationary, as and for the purposes specified.

Fifth, We claim the supports, s or t, fitted to rock or turn down, in combination with the traveling carriage, and reversible head, g, substantially as and for the purpose specified.

63,409.—APPARATUS FOR SEPARATING HIGH AND LOW WINES.—Edward B. McDowell and Thomas W. Wilson, Philadelphia, Pa.

First, We claim the combination of a thermometrical tube and a hydrometer with a balancing lever, the same being arranged to operate together, substantially as and for the purpose described.

Second, We also claim, in combination with the subject matter of the above claim, the application of a valve to the lever, so that the said valve will be operated thereby in relation to the outlet tube beneath it, substantially as and for the purpose described.

63,410.—GRAIN CLEANER.—John McTaggart, Rochester, N. Y.

I claim the peculiar form and arrangement of corrugations when combined with the perforations or their equivalents, substantially as specified.

63,411.—SPARK ARRESTER.—William J. Mehary, Philadelphia, Pa.

I claim the inner casing, D, its wire-gauze cover, E, and deflector, H, the casing, B, chimney, A, and the annular opening, b, the whole being constructed and arranged substantially as and for the purpose herein set forth.

63,412.—DRYING APPARATUS.—John O. Mellen, St. Louis, Mo., assignor to L. G. Quinlan, Jr.

I claim the hollow spiral or spirally-flanged conveyors, C, in combination with a double bottom trough, B, and chamber, b3, substantially in the manner and for the purpose herein set forth.

63,413.—MODE OF MANUFACTURING ICE.—T. S. C. Lowe, New York City.

First, I claim compressing carbonic acid or other equivalent gaseous body into a liquid by a pump, and then permitting it to expand in a close chamber, in contact with the exterior surface of the vessels or pipes containing the water or other substance to be refrigerated.

Second, Compressing carbonic acid or other equivalent gaseous body into a liquid by a pump, and then permitting it to expand in a close chamber in contact with the exterior surface of the vessel or pipes containing the water or other substance to be refrigerated, and then returning the gas to the condensing pump to be recompressed and reissued.

Third, Compressing carbonic acid or other equivalent gaseous body by a pump having sufficient power to convert it into a liquid, removing the heat evolved by compression by exposing the pipe containing the compressed gas to the action of cold currents of water or air in contact with the surface thereof, and then permitting it to expand in a close chamber in contact with the exterior surface of the vessels or pipes containing the substance to be refrigerated.

Fourth, Compressing carbonic acid or other equivalent gaseous body by a pump having sufficient power to convert it into a liquid, and removing any watery vapor or moisture from the compressed gas by passing it through chloride of calcium or equivalent absorbent.

Fifth, Introducing the cold current of water or air to the cooling coil at the point most distant from the pump and causing it to flow along the pipe towards the pump and escape from the point nearest the compressing pump.

63,414.—MACHINE FOR CUTTING OUT THE BODIES OF FRUIT BASKETS.—Henry Mellish, Walpole, N. H., assignor to David Lyman, Washington Whitney, and Gilman Waite.

First, I claim the two parallel rings, J J', enclosing the log, and traversed along as the work proceeds and carrying the cutting apparatus, substantially in the manner herein set forth.

Second, I claim, in combination with a machine cutting conical spiral shavings, the knife, R, carried on a rolling device as represented and adapted to measure off and cut uniform length of such shaving as herein specified.

Third, I claim cutting holes or slots in the bodies of baskets made from shavings by means of the cutters, Z, or their equivalents, arranged and operating as specified.

Fourth, I claim the supplementary cutters, M and N, arranged and operating as and for the purpose herein specified.

63,415.—MACHINE FOR CUTTING TOY PAILS FROM WOOD.—Henry Mellish, Walpole, N. H., assignor to David Lyman, Washington Whitney, and Gilman Waite.

First, I claim the conical scroll cutter head, L, for supporting the knife or knives arranged in the manner substantially as and for the purpose set forth.

Second, I claim arranging or supporting the conical scroll cutter head, L, in such a manner as to leave a space between the scroll and the frame of the slide rest to which it is attached, as and for the purpose set forth.

Third, I claim the combination of the knife, M and O, with the conical scroll cutter head, L, when operating substantially as and for the purposes set forth.

Fourth, I claim the helical ring, L, with its cutter, N, in combination with the scroll cutter head, L, substantially as and for the purposes set forth.

63,416.—GAS ENGINE.—Francisque Million, Paris, France.

I claim, First, The combination of the cylinder, C, the pump, A and B, the branch receiving pipes, a and b, and the mixer, F, in such a manner that the air and gas to supply the engine shall be forced simultaneously through the mixer to supply the cylinder by the simultaneous action of the two pumps, A and B, as set forth.

Second, The combination of the mixer, F, represented in figs. 4 and 5, composed of a folded plate of metal as described, with the branch pipes, a' and b', so constructed and arranged in combination with each other and the main pipe as to deliver the gas in the latter in their alternate layers, as set forth.

Third, The combination of the parts represented in fig. 7, or their equivalent, with the cut-off rod, in such a manner that the closing of the current shall be effected simultaneously with the closing of the cut-off valve, substantially as and for the purpose set forth.

Fourth, The combination with a gas-burning engine of a porous substance, B, placed in the receiving pipe, as represented in fig. 8, substantially as and to the effect set forth.

63,417.—BLOTTER.—Charles C. Moore, New York City.

I claim the attachment of the lower plate of "C. C. Moore's improved Blotter," one or more pieces of felt, or other elastic material equivalent for the purpose, forming an elastic pad or springing cushion, substantially as herein described and for the purposes specified.

63,418.—WATER TANK FOR RAILROADS.—John Morton, Winchester, Ind.

First, In combination with the tank, A, and stationary pipe, B, I claim a horizontally adjustable connecting pipe, D, arranged to operate substantially as and for the purpose set forth.

Second, The combination of the pipe, B, adjustable connecting pipe, D, and adjustable hinge, E, substantially as set forth.

Third, The combination of the horizontally adjustable pipe, D, and the ropes and weights, H, and swivel pulley, I, substantially as and for the purpose set forth.

Fourth, The combination of the cord, C2, bell crank, C1, and valve, C, with its stem and weights, G, substantially as set forth.

63,419.—FILING AND RECORDING BONDS, ETC. — Francis Munson, Chicago, Ill.

I claim, First, The preserving, filing, and verifying of bonds, coupons, certificates, and all similar documents, by the means and in the manner substantially as herein set forth.

Second, I claim the book and register, constructed and used as and for the purposes set forth.

63,420.—PROCESS OF CLEANING TEXTILE FABRICS AND YARNS SOILED IN DYEING.—Alfred Paraf, Mulhouse, France.

In the process of cleaning of the whites of textile fabrics or yarns, which have been soiled during the dyeing operation by madder or other vegetable coloring matter, I claim in lieu of and as a substitute for the soaping heretofore practised, the use of animal charcoal either alone or in combination with vegetable charcoal, substantially in the manner hereinbefore described.

63,421.—MECHANISM FOR OPERATING THE PICKER STAFFS OF LOOMS.—Willoughby W. and V. J. Phillips, Wellsville, N. Y.

I claim the ratchet wheels, R R, and pawls, P P, in combination with the cams, F F, bent rod, m, spring, S, picker staff, B, rod, a, and picker, C, for operating the shuttle, substantially as described.

63,422.—STOVE PIPE.—Martin L. Powell, Newcastle, Ind.

I claim, First, The collar, A, constructed substantially as set forth, so as to be attached to the stove in any of the modes above set forth.

Second, I claim the reversible elbow, B, composed of any number of angles, the sum of which shall make an angle of 45 degrees, constructed and operated substantially as and for the purposes set forth.

Third, I claim the combination of the reversible collar, and the reversible elbow, B, constructed and operated in combination, substantially as and for the purposes set forth.

63,423.—ADJUSTABLE POLE FOR CARRIAGES.—J. E. Prudden, Birmingham, Conn.

I claim the combination of the key bolt, F, the inclined plate, E, and the shackle, A, when constructed and arranged so as to be adjustable, substantially in the manner specified.

63,424.—COMBINED PLANTER AND CULTIVATOR. — Ansel Wallace Putnam, Suisun, Cal.

I claim, First, The apparatus for furrowing for and covering the seed, consisting of the marker, b, the diverging plates, T T, and the converging plates, V V, combined and arranged substantially as described.

Second, The wheel, D, and bent arm, E, together with the sliding plates, L L', and the regulating slide, F, for dropping the seed, constructed and operated substantially as described.

Third, The rocking chair attached to the frame, and the hinged arm, h h, for the purpose of raising and lowering the frame, substantially as described.

63,425.—WAGON SEAT.—Ezra Reed, Owego, N. Y.

I claim a spring wagon seat, made either of wood or iron, when constructed in the manner and for the purpose substantially as herein set forth.

63,426.—CULTIVATOR.—James H. Reynerson, Pleasant Plain, Iowa.

I claim the manner of shifting the plows and beams either in or out, by means of the slotted rods and curved slotted bars of iron at D D D D, and the upright bar with holes, together with the movable cross timber and slide at E, also the manner of fastening the shovels to the beams by means of blocks of wood at H H H H.

I also claim as an improvement the general construction and combination of the machine aside from the wheels, axle, and tongue.

63,427.—HARVESTER RAKE.—Lafayette M. Rice, Oregon, Wis.

I claim, First, The combination of the five wheels, x r s b c, arranged substantially as set forth, to affect the reciprocating motion of the rake.

Second, The combination of the connecting rod, J, the crank, I, the points or heads, P O, the pin, W, and the rods, C D, to affect the raising of the rake, and the lowering it down.

63,428.—COMPOSITION FOR COATING WOOD AND OTHER MATERIALS.—Charles L. Robertson, Providence, R. I.

I claim a composition for coating articles of wood or other material, prepared substantially as herein described, which under the application of heat will develop the characteristics herein mentioned.

63,429.—ROOFING.—Frederick O. Rogers, Niles, Mich.

I claim a roof covered first, with felt, or equivalent fibrous substance, then with roofing composition or pitch, and finally with the tar mortar, substantially as herein specified.

63,430.—CULTIVATOR.—Theodore B. Rogers, Weathersfield, Conn.

I claim the frame, A, arm, B, posts, D, in combination with the blade, E, and bearers, F, substantially as and for the purpose described.

63,431.—STEAM GENERATOR.—Stephen P. Ruggles, Boston, Mass.

I claim arranging a steam chamber or generator at or near the bottom of a closed steam boiler, as and for the purpose substantially as herein described.

63,432.—DEVICE FOR SALTING AND SEASONING MEAT.—Warren Sadler, Lockport, N. Y.

I claim the instrument as shown and described consisting of the tube, A, probe, C, and scoop, D, operated as set forth.

63,433.—BABY CARRIAGE AND VELOCIPEDE.—Joseph Scheen, New Haven, Conn.

First, I claim the upright, z, with its socket, m, and rubber spring, n, or equivalent, in combination with the grinding wheel, w, as set forth.

Second, The combination of the levers, f, cranks, g, ratchet, d, and wheels, k, when constructed and arranged substantially as described.

63,434.—HAT-BLOCKING MACHINE.—Julius Sheldon (assignor to Griswold and Sheldon), New York City.

First, I claim the combination of stem, a, plate, c, and bars, d, arranged substantially as described.

Second, The combination of the ring, l, with the springs, m, one separate spring for each clamp, arranged substantially as described and for the purpose specified.

Third, The rubber ring, p, applied to the tip of the hat body, substantially as described.

Fourth, The combination of the ring, o, with the ring, l, the said ring, o, being made detachable, substantially as described and for the purpose specified.

63,435.—APPARATUS FOR FORMING HATS.—Louis Simonet, Paris, France.

First, I claim locking and unlocking the dome, b b', carrying the diaphragm, o, and the several connections by a bayonet joint, constructed and arranged substantially as and for the purposes herein set forth.

Second, I claim, in combination with the turning dome, b, and its connections, the fixed frame, a, and its connections, and the forcing means, f, etc., the adjustable bracket, i, supporting the water-carrying joint, c, so that it can be moved horizontally and vertically, substantially as and for the purpose herein set forth.

Third, I claim, in combination with the dome, b, diaphragm, O, water joint or hinge, c, mold, w, and locking and unlocking means, as herein specified, the fluid reservoir, a', constructed in and joining a part of the framing, a, substantially as and for the purposes herein set forth.

63,436.—CHIMNEY.—C. F. Smith and J. Speth, Aurora, Ill.

We claim the combination of the bricks, A, when laid in chimneys, in combination with the common bucks, H, substantially as set forth and described.

63,437.—TRANSPARENT SLIDE FOR THE MAGIC LANTERN.—Samuel Solomons, London, England.

I claim a magic lantern slide, consisting of a sheet of gelatine, or its equivalent, ornamented, as herein described and confined between two plates of glass.

63,438.—BIT BRACE.—Greenleaf Stackpole, New York City.

Antedated March 18, 1867.

I claim the bit brace, constructed and operated substantially as herein described.

63,439.—TABLE CUTLERY.—James Stott, Philadelphia, Pa.

I claim the blocks, D and D', with the rings, e', and rivet, f, constructed and adapted to the scales, B and B', their openings, i i, and recesses, e e, and to the shank, a, of a table knife, substantially as described for the purpose specified.

63,440.—CURTAIN FIXTURE.—Levi H. Thomas, Waterbury, Vt. Antedated March 27, 1867.

I claim the elastic friction band, G, in combination with the elongated roller arbor, B, and pronz, F, on the bracket, E, operating substantially in the manner herein described for the purposes set forth.

63,441.—LANTERN.—William S. Thompson, Rochester, N. Y.

I claim the combination and arrangement of the two slots i i, and apertures j j, concentric with the annular plates f m, and pins l l, with the parts A, and E, of the lantern case, substantially as and for the purposes set forth.

I also claim in combination therewith the concentric flanges n o, of the rims f m, the one fitting within and serving as a guide for centering, the other arranged and operating substantially as described.

63,442.—MACHINE FOR FORMING THE BARB OF CROCHETING AND KNITTING NEEDLE.—J. P. Tirrell, North Bridgewater, Mass., assignor to himself, J. O. Nash, J. E. Nash, and Ira Merritt.

I claim the combination of devices in their equivalents substantially as described by means of which the needle blank is held and carried and acted upon by the milling tool all as set forth.

63,443.—MOLD FOR CASTING GROOVED ROLLS.—Robert C. Tolten, Pittsburg, Pa.

I claim a series of metallic rings, each ring made in one or more pieces with angular rectangular or curved inner faces for forming the grooves of a grooved chilled roll, such rings being packed in a mold made of sand or other more metallic composition, or arranged substantially as described with other rings which form the cylindrical surface of the mold, the construction being substantially as above set forth.

63,444.—GATE.—E. H. Van Eps, Farmington, Iowa.

I claim the manner in which the gate c, is hung by the means of vibrating bars d, being attached to beam e, and bottom bar of gate f.

I also claim the latch g, for the purpose of holding the gate open as herein set forth.

63,445.—MACHINE FOR COILING WIRE.—William Weaver, Phœnixville, Penn.

First, I claim the frame A, with its standards B, and B', and revolving former D, the whole being constructed arranged and operating substantially as and for the purpose described.

Second, The tension guide G, consisting of the jaws n n', with the projection q, and recesses o, and u, the whole being arranged for use in connection with the revolving former D, substantially as described.

Third, The grooved cylinder i, constructed and adapted for attachment to the conical grooved section h h', of the former D, substantially as and for the purpose specified.

Fourth, The former D, with its openings j, adapted for the reception of a detachable pin m, for the purpose set forth.

63,446.—MACHINE FOR CUTTING SCREWS.—George H. Wells, (assignor to himself and Judson A. Cleveland,) Logansport, Ind.

First. I claim the combination of the stock A, hinged jaw H, and adjustable cutters C, substantially as described.

Second, The combination of the stock A, cutters C, bar E, cam F, constructed and arranged substantially as and for the purpose set forth.

Third, The combination of the stock A, jaw H, and adjustable leg B, substantially as described.

Fourth, The adjustable bearings K, in combination with the jaw H, and stock A, substantially as described.

Fifth, The combination of stock A, hinge and jaw H, set screws H2 lug e, and wedge formed key H', substantially as described.

63,447.—CULTIVATOR.—P. L. West, Bath, Ill. Antedated March, 19, 1867.

First, I claim the construction and arrangement herein shown and described of the plows D D, their attachment links d2 and their draft rods f.

Second, I claim the devices C, a C1 C2 C3 and c' for giving the plows D, the requisite lateral motion.

Third, I claim the combination and construction of the posts d' and props d4, substantially as described and set forth.

Fourth, I claim the construction and arrangement of the plows D' and the curved bars D3 also the device d5 d6 c7 d., for raising the said plows up out of the ground, substantially as described and set forth.

63,448.—BARBER BRUSH.—John A. Wiedersheim, Philadelphia, Pa.

I claim as an article of manufacture the barber brush the same consisting of a flexible back and a rubbing portion o. elastic fringe C, substantially as herein represented and described.

63,449.—CEMENT.—Leonard Woolworth, Albion, Wis.

I claim the use of my new cement as herein described using as materials for its composition the articles above enumerated.

63,450.—REVOLVING FIRE ARMS.—Reuben W. Drew, Lowell, Mass.

First, I claim the tubular sliding ejector constructed and operating in the manner described.

Second, the arrangement of the hinged guard with devices for fastening the same in place when constructed and attached to the stock or frame in relation to the perforated cylinder all in the manner described.

63,451.—COTTON CULTIVATOR.—Robert N. Adams, Greenfield, Ohio.

First, I claim the rotating hoes in combination with the endless chain and the two pulley wheels B', and c', constructed and arranged substantially as described.

Second, I claim the thinner S, in combination with the inclined cogs on the driving wheel s, and the intermediate machinery by which a vibrating motion is given to said thinner, substantially as described.

Third, In combination with the vibrating thinner and the revolving hoes, I claim the scrapers D D, constructed and arranged substantially as described.

63,452.—SPIRIT METER.—Joshua G. Allen, Philadelphia, Pa.

First, I claim the application of the escapement movement consisting of the lever L, acting upon the ratchet wheel S, or its equivalent for the purpose of regulating, controlling and calling into action the motive power and machinery use. for turning and working the stop cocks and valves constructed substantially in the manner herein described and set forth.

Second, The bifurcation or division into two arms M. and N, of one end of the escapement lever L, constructed substantially in the manner and for the purpose herein set forth.

Third, The hole or perforation O, in the lower arm of the escapement lever L, for the purpose of allowing the rod Q, of the float or float pan R, to pass through it.

Fourth, The application of the float or float pan R, constructed substantially in the manner herein set forth and used for the purpose of regulating moving and controlling or sliding in regulating moving and controlling, the escapement lever L, and attached machinery.

Fifth, The series of glass tubed or hydrometer chambers H, constructed substantially in the manner and for the purpose herein set forth.

Sixth, The graduation of the hydrometer chamber-tubes H, and this connection with the receiving cistern so as to indicate the depth or amount of liquid in the cistern.

Seventh, The application of a stop cock v, or its equivalent with each hydrometer chamber so arranged, moved, turned and worked by appropriate machinery as to keep secure and retain for a variable period of time a specimen of the liquid or spirits, that are or may have been in the cistern.

Eighth, The application of cam wheels Y Z, for the purpose of thus turning, working and regulating the hydrometer chamber's stop cocks or valves v, constructed and acting substantially in the manner herein described and set forth.

Ninth, The combination and connection of this series of hydrometer chambers H, with the three-way cock C, or an equivalent valvular arrangement for regulating the ingress and egress of the spirits to and from the cistern constructed substantially in the manner and for the purpose herein set forth.

Tenth, The application of the interrupted cog wheels c d, for the purpose of turning, regulating and reversing the three-way valves as herein described and set forth.

Eleventh, The arrangement of two or more spirit meters with a corresponding number of cisterns each and all leading to the main pipe A, coming from the same still with a plain ordinary stop cock F and S, at a suitable and convenient place in each pipe thus leading to the main pipe A coming form the still as herein described and set forth.

Twelfth, The combination and connection with each other of the various parts of the machine herein described and claimed, constructed substantially in the manner and for the purpose herein set forth.

63,453. — MATERIAL FOR PREVENTING INCRUSTATION IN STEAM BOILERS.—Josiah J. Allen, Philadelphia, Pa.

I claim the application to steam boilers in the manner described or any equivalent to the same of hydro-carbons, for the purpose specified.

63,454.—PUMP PISTON PACKING.—M. J. Althouse, Waupun, Wis.

First, I claim providing for sustaining a leather, rubber or other soft packing between expansible rings or segments so as to protect the exposed portions of the soft packing, substantially as described.

Second, The combination of the expansible hard metal or wood rings, and the rubber or other soft rings, all constructed and applied substantially in the manner and for the purpose herein described.

63,455.—GATE.—Sherman E. Anthony, Stillwater, N. Y.

First, I claim the hinged guide bars, C, in combination with a sliding gate, A, arranged to operate in the manner substantially as shown and described.

Second, The curved rod, E, attached to the post, B, the rod, j, in the gate A, arranged on a guide slat or bar, C, substantially as and for the purpose specified.

63,456.—SASH SUPPORTER.—Joseph Ayers, Greenbush, N. Y.

I claim the spring attached to the edge of the sash and engaging in recesses in the casing, substantially as described and represented.

63,457.—SHIFTING RAIL FOR CARRIAGES.—Alonzo E. Bailey (assignor to himself, W. W. Mosher and W. W. Jackson), Middleville, N. Y.

I claim the pivots, B, back rail, C, composed of one piece, and having pendent pieces, the lower ends of which hover said pivots, B, on the back of the seat, A, and top rail, D, composed of one piece and fitting over the pivots, B, substantially as herein set forth for the purpose specified.

63,458.—CARRIAGE STEP.—Francis Baker, New York City.

First, I claim the combination with a carriage body of a series of steps whether more or less in number, when such steps can be folded up or together and the said body is suitably constructed to receive and hold the same, substantially as and for the purpose described.

Second, I claim the spring catches H and J, whether separately or together, substantially as described for the purpose specified.

63,459.—WRENCH.—Samuel S. Barnaby, Chicago, Ill.

I claim the movable jaw, l, hollow sleeve, o, spring plate, n, spiral spring, y, cam lever, w, constructed, arranged and operating upon the bar, c, substantially as and for the purposes herein set forth.

63,460.—Suspended.

63,461.—MACHINE FOR DRYING CLOTH, ETC.—Leander W. Boynton, Hartford, Conn.

First, I claim the combination of the endless chains and the tenter hooks in a machine in which high steam is used, when the machine is constructed, combined and fitted to produce the result, substantially as herein described and set forth.

Second. The combination of the apparatus for conveying the cloth to be dried with an apartment in which high steam is used (where most of the moisture is converted into steam) and an apartment supplied with dry air (when the drying is completed) when they are constructed and arranged substantially as herein described and set forth.

63,462.—DRYER FOR WOOL, ETC.—Leander W. Boynton, Hartford, Conn.

I claim the combination of the internal cylinder, D and its wings or vanes E E etc., with the eduction port, B, and the induction port, C, when the whole is constructed and arranged and the cylinder, D, caused to revolve substantially as herein described and set forth.

63,463.—PLAITING ATTACHMENT FOR SEWING MACHINES.—Samuel C. Brown, Borough of Carlisle, Pa.

First, I claim my improved plaiter made with the combination and arrangement of the adjustable plates, A and B, the adjustable gage, I, and the stationary gage, C, operating and connected with D in the manner and for the purpose described in the foregoing specification.

Second, The adjustable parts, L and F, and the rod, H, and plate, E, operating as described and connected adjustably to the sewing machine by means of the part, G, in the manner and for the purpose described in the foregoing specification.

63,464. — SEAT OR SHELF. — Franklin C. Brownell, East Orange, N. J.

I claim the standards, C, with the recesses, E E, and with or without the recesses, H H, the arms, L, and projections, A, combined and arranged substantially as and for the the purposes specified.

63,465.—CLAMP FOR LEATHERING BILLIARD CUES.—E. Brunswick, Chicago, Ill.

I claim the clamps to leather the billiard cues, constructed and operating substantially in the manner herein described and specified.

63,466.—GATE LATCH.—Joseph T. Bryan, Lebanon, Ind.

I claim the latch, 1 and 2, and the connection of this latch, 1 and 2, with the catch, 5, and incline, 6, all operating and arranged as described and for the purpose set forth.

63,467.—PADLOCK.—Ira D. Bush, Detroit, Mich.

I claim the combination of the sliding link bolt, B, stop, D, and locking bolt, G, or their respective equivalents, when arranged together and operating substantially as and for the purpose described.

63,468.—CLAMP FOR FURNACE MOLDS.—Edward Card, Providence, R. I.

I claim the hollow arm, with a ratchet arm movable back and forth within it by a cog wheel in combination with a lever pawl to operate upon said ratchet; together forming a clamp for the uses and purposes for which clamps are used and to which this may be adapted, shaped and constructed, as herein described and set forth.

63,469.—STEAM GENERATOR.—Charles E. Case, Xenia, Ohio.

First, I claim the application to the exterior of steam generators of a coating composed of asbestos mixed with fire clay and held in place by a metal covering, as herein shown and described.

Second, In combination with a generator, constructed as herein described, I claim the coiled pipe, B, terminating in the perforated nozzle, C, all arranged to operate as set forth.

63,470.—DENTISTS' VULCANIZING FLASK.—Henry F. Clark, Poughkeepsie, N. Y.

I claim a dentist's vulcanizing flask constructed substantially as herein shown and described, and with the parts secured and held together by keys, substantially as set forth.

63,471.—MACHINE FOR BURRING WOOL, GINNING COTTON, ETC.—Robert J. Clay, Greenpoint, N. Y., assignor to himself, James T. Husted, Etenger J. Burling, and Cornelius Corson.

We claim, First, In machinery for burring wool, ginning cotton, or other analogous purposes, a combination with a suitable feed and burr or seed extractors or delivery device of a gang of reciprocating blades having sawshaped teeth at their edges for operation relatively to the feed, substantially as specified.

Second, The combination in connection with a suitable feed of a series of reciprocating blades having teeth on their edges and working through ways or passages which pass the fiber but exclude the burs, with a series of intermediately arranged rotary burr extractors, for operation together as herein set forth.

Third, The toothed shaped blades, J, made of taper form in direction of their length, as described, in combination with a suitable feed, and series of burr extractors, essentially as and for the purposes herein specified.

Fourth, In a gang of saw-shaped blades operating as described, for the purposes set forth, constructing the teeth of said blades straight or shelving on their outer edges and sharpened from their roots to their points on their outer or front faces, substantially as shown and described.

63,472.—BEEHIVE.—Hamilton Clipp, Orange, Ind.

I claim the combination of the sliding feed troughs, B, with the interior boxes, E and F, of the hive, when said sliding troughs are constructed and arranged substantially as herein described and for the purposes set forth.

63,473.—SULKY PLOWS.—Daniel W. Colburn, Loami, Ill.

I claim the combination and arrangement of the beams, E, chains, D, roller, C, arm, K, notched bar, J, and standard, I, substantially as described, for the purpose specified.

63,474.—TOOLS FOR UPSETTING FLANGES.—James Connolly, Newburgh, N. Y.

I claim the tool aforesaid, for flanging as above described, and which will produce the intended effect.

63,475.—POTATO DIGGER.—S. B. Conover, New York City.

I claim, First, The combination of the carrying wheel, D, with the shovel plow, C, each constructed substantially as herein set forth, for the purpose specified.

Second, The construction of the carrying wheel, D, with curved slots or openings, n°, substantially as herein set forth, for the purpose specified.

Third, The combination of the guards or fenders, F, with the carrying wheel, D, substantially as herein set forth, for the purpose specified.

Fourth, The shaking screen, E, arranged in relation with the carrying wheel, D, and shovel plow, C, substantially as herein set forth, for the purpose specified.

Fifth, The arrangement of the deflecting arms, I, in relation with the shovel plow, C, and carrying wheel, D, substantially as herein set forth, for the purpose specified.

63,476.—COMBINED CULTIVATOR AND PLANTER.—S. B. Conover, New York City.

I claim, First, The combination with the main frame, A, supplemental frame, D, and fixed ratchet bar, F, of the operating lever, E, bell crank levers, b, horizontally connecting rods, c, and upright connecting rods, d, substantially as herein set forth, for the purpose specified.

Second, The sliding rods or braces, I, attached to the supplemental frame, D, passing up through suitable holes or slots either vertically or on an incline, in combination with the main frame, A, and operating parts above recited, substantially as herein set forth, for the purpose specified.

63,477.—COTTON AND HAY PRESS.—J. W. Conway, Madison, Ind. Antedated March 21, 1867.

I claim both pressing and compressing the bales in one press, when the followers act alternately, and by the same arrangement of leverage, but in reverse motions thereof, substantially as and for the purpose herein specified.

I also claim the detached follower, D, arranged and operating substantially as and for the purpose herein set forth.

I also claim the system of six levers, G H I J K and L, arranged and operating in combination with the sliding rack, N, substantially as herein described.

I also claim the combination of the lever system, G H I J K and L, and the toggle lever and bar, R S, through the medium of the rope, T, substantially as herein specified.

63,478.—HARNESS SNAP.—Edward A. Cooper (assignor to himself and J. N. Johnson), Lancaster, N. Y.

I claim securing the spring, C, to the main body of a harness snap, by means of the lug, D, the thumb lever or tongue, B, being made so as to shut over and inclose the lug, in the manner substantially as herein described.

64,479.—GRINDING MILL.—Martin Cosgro, Peoria, Ill.

I claim the mill stones constructed with oblique top wings, a connected to oblique side wings, b, and operating substantially as described, for the purpose specified.

63,480.—LANTERN.—A. R. Cribfield, Lincoln, Ill.

First, I claim a hot air chamber above the glass globe or lantern case, in combination with an air pipe or pipes to conduct the heated air therefrom to the chamber in the base, from which the illuminating flame is fed with oxygen, substantially as and for the purpose described.

Second, I claim so arranging the air-conducting pipes, P P P, as to serve the purpose of guards to the glass globe or lantern case, as well as that of conducting air to the lower air chamber, substantially as described.

63,481.—WRENCH.—James E. Cronk, Poughkeepsie, N. Y.

I claim the combination of the eccentric wheel, G, the pin, F, projecting from one part, A, of the wrench, and the recess or slot, E, in the other part, A, substantially as shown.

63,482.—PICKET FOR FENCES AND WALLS.—Alphonso Dabb, Elizabethport, N. J.

I claim as a new article of manufacture a picketed strip made up of a wrought iron bar or strip, a, and malleable cast iron pickets, B, for use on walls or fences, substantially as specified.

63,483.—SEWING MACHINE.—George S. Darling, Bridgeport, Conn., and Elias Howe, Jr., Fairfield, Conn.

We claim, First, The pin, b, or its equivalent, projecting from or connecting with the bar or any other part of the presser foot, to act in combination with the take up, E, substantially as and for the purpose described.

Second, The pivoted elbow lever, F, operating in combination with the presser foot, substantially as described, for the purpose specified.

63,484.—SALTING AND PRESERVING MEAT AND OTHER MATERIALS.—Enoch Darnell, Fox, Ill.

I claim the mode of preserving salt meat, lard, butter, or other substances, by means of stone, brick, or concrete tube built in a stone or brick walled cellar, substantially in the manner herein described and specified.

63,485.—CHURN.—George Deckman, Malvern, Ohio.

I claim the combination of a series of double concave disks, L, attached to a horizontal shaft, H, with the box, A, having rockers, F, attached to it, substantially as herein shown and described and for the purpose set forth.

63,486.—SAW.—Chas. Disston, Philadelphia, Pa.

I claim the lips, i, on the edge of the projection, d, of a saw tooth or on the edge of the recess in the blade, in combination with a groove and recesses, m, in the projection or in the blade, substantially as specified.

63,487.—MODE OF MANUFACTURING SAW BLADES.—Henry Disston, Philadelphia, Pa.

I claim a saw blade composed of tough wrought iron or homogeneous or Bessemer steel, and having a hard, carbonized exterior surface.

63,488.—WASHING MACHINE.—Robert E. Downie and H. C. Johnson, Delavan, Wis.

First, We claim the eccentric shafts, E E, employed for adjusting the vertical position of the roller frame, D D, and resting upon the bottom of the tube so as to sustain the said frame at both ends, substantially as described and represented.

Second, In combination with the above we claim the removable uprights, F F, pendent bar, H, and rubber, I, all arranged in the manner and for the purpose specified.

63,489.—LITHOGRAPHIC PRESS.—George Dunlop, Brooklyn, N. Y.

First, I claim the movable carriage, A, containing a wetting roller, a, and inking-in rollers, & H, in comoination with the trip lever, e, dog, f, cam, f', and feed rollers, E, constructed and operating substantially as and for the purpose described.

Second, The springs, g, under the ends of the rail, C, in combination with the carriage, A, containing the inking-in rollers, G H, and with the feed rollers, E F, constructed and operating substantially as and for the purpose set forth.

63,490.—HOT-AIR FURNACE.—H. A. Engels, C. H. Engels, and John Wieland, San Francisco, Cal.

We claim the arrangement of the set of pipes, c l p l q, bolted and cemented together, and at the same time staying the side plates, the sections and the whole structure of the furnace by means of the grooved shoulders and flanges of said pipes, as shown in figs. 5 and 6, in combination with the square tubes or drying chambers, r s, substantially in the manner, for the purpose, and upon the principle as herein set forth.

63,491.—MACHINE FOR TRIMMING METALS.—James H. Ferguson and Henry W. Lovejoy, New York City.

We claim the clamps, D, and carriage, E, in combination with the table, F, cutter head, A, on the adjustable headstock, B', and stationary knife, H, all constructed and operating substantially as and for the purpose described.

63,492.—EXTRACTING SILVER FROM ARGENTIFEROUS LEAD ORE.—C. Flemming Flach, Call, Prussia.

I claim improvement in extracting the silver and treatment of the lead contained in argentiferous lead ore by the means of a blast furnace process, in a manner substantially as described above.

63,493.—CHURN.—Orlando V. Flora, Madison, Ohio, and Jas. S. Bogle, Springfield, Ind.

We claim the combination of the dasher, G G, breaker slats, H H, fan, N, and ice box or chamber, S, arranged and operating substantially as and for the purpose herein specified.

63,494.—TREADLE.—John G. Folsom, Winchendon, Mass., and W. C. Anderson, St. Louis, Mo.

First, We claim the adjustable shackle bar, D, with the hinged stirrup, E, and band, F, in combination with the driving wheel of a sewing machine or of any other small machine and with a suitable clamp, B, constructed and operating substantially as and for the purpose set forth.

Second, The sustaining plate, b, in combination with the machine, C, clamp, B, wheel, A, shackle bar, D, and stirrup, E, all constructed and operating substantially as and for the purpose described.

63,495.—WEATHER STRIP.—James P. Force and William W. Egnew, Jarvis, Ind.

We claim the bent rod, E, hinged in the holdfast, F, constructed and operating as described and represented.

63,496.—APPARATUS FOR EXPELLING WATER FROM THE HOLDS OF VESSELS.—Thos. W. Fox, New London, Conn.

First, I claim the combination of the valve with the cylindrical vacuum producer, when they are constructed, arranged, and fitted for use substantially as herein described and set forta.

Second, I claim the combination of the cylindrical vacuum producer with the elongated main cylinder when they are so constructed and fitted to each other that when the part, K, of the cylindrical vacuum producer is raised out of the water the part, I, will close the apertures, C, in the main cylinder, substantially as herein described and set forth.

Third, I claim the combination of the cylindrical vacuum producer with the rod, E, and its collar and binding screw, m, when they are so arranged and connected that the cylindrical vacuum producer may be raised or lowered by the rod, E, and may be secured at any and every desired elevation by the collar and binding screw, or any other analogous device, substantially as herein described and set forth.

63,497.—BELT RIVET.—Conrad Frank, Cincinnati, Ohio.

I claim the combination of the internally threaded conical sleeve, E, the screw, F, and the two flange heads, B C, all constructed as and for the purpose herein shown and described.

63,498.—WIND MILL.—H. P. Gallup, Medina, Mich. Antedated March 21, 1867.

I claim, First, The wind wheel, C, with arms, c1, fitted in grooves constructed and arranged in the wind chamber, substantially as described and for the purpose set forth.

Second, The combination with the wind wheel, C, of the inclined wind passages, D, substantialip as described and for the purpose set forth.

Third, The combination with the air passages, D, of doors, E, substantially as described and for the purpose set forth.

63,499.—MACHINE FOR CLEANING FLAX AND HEMP.—Arnold Gartner (assignor to himself and M. O. Luttgen), New York City.

First, I claim the drum, A, provided with yielding beaters, D, and rigid flyers, E, in combination with the adjustable curved aprons, C, extending from the rests, F, substantially as and for the purpose set forth.

Second, The lips, c, extending from the ends of the beaters, D, over the boxes, b, substantially as and for the purpose described.

63,500.—BED BOTTOM.—Cyrus F. Gillette, Sparta, Wis.

I claim, in a bed bottom having the cord passing around a series of pulleys, b b, the arrangement of the slats, B B, placed above the pulleys, when in combination with the shaft, C, as specified.

63,501.—CORN HUSKER.—John W. Glass, Richland, Indiana.

I claim the bars, A B, constructed as described, and provided with the hook, D, and rest, C, with plate, m, leather, g, and loop, d, when constructed and used as and for the purposes herein fully set forth.

63,502.—PAINT MILLS.—Samuel J. Goodwin, Rockton, Ill.

I claim the revolving grinding nut, when constructed with a beveled rim at its lower portion, substantially as described.

63,503.—DIE FOR MAKING CANS.—James L. Gray, Baltimore, Md.

First, I claim expanding dies, A A', and stamp heads, D D2, constructed and operating substantially as described,

Second, The rings, J, in connection with the expanding dies, A A', substantially in the manner and for the purpose described.

63,504.—SOLDERING MACHINE.—James L. Gray, Baltimore, Md.

First, I claim a rotary bed, B, in combination with a yielding holder, g, or their equivalents, operating substantially as and for the purpose described.

Second, The spurs, b, in connection with the yielding holder, g, substantially as and for the purpose described.

Third, In combination with the rotary bed, B, and yielding holder, g, I claim the soldering iron support, substantially as and for the purpose described.

Fourth, The within described machine for centering, supporting and rotating preserve cans, said machine having its parts constructed, arranged, and operated substantially as set forth.

63,505.—PRESERVE CAN.—James L. Gray, Baltimore, Md.

First, I claim a preserve can which has formed on its ends grooved flanges the grooves of which are adapted for receiving the edges of the cap and bottom plates, and strengthening the ends of the cans, substantially as described.

Second, A can which has one or both of its edges turned inward and crimped so as to leave a v-shaped groove or grooves, substantially as and for the purposes described.

63,506.—FLOUR BOLT.—Henry Gross and Jesse B. Rumsey, Tiffin, Ohio.

First, We claim the cam wheels, a I, and spring, d, or their equivalents, so arranged in combination with a bolt or rail which vibrates upon its shaft, substantially as herein specified.

Second, The arrangement of the rod, H, spring, F, lever, F, and sleeve, G, with reel and its pins, substantially as and for the purpose specified.

63,507.—BRIDGE.—Remig Grotz, Chicago, Ill.

First, I claim the mechanical device, c nsisting of a combination of levers and weights as described, said levers being connected with and acting upon the upright shafts to which the gates or barriers and the lanterns are secured, the whole constructed and operating substantially as and in the manner herein described and specified.

Second, The lip at the curved end of the bridge, constructed and operating as described, in combination with the said mechanical device, as and for the purposes set forth

63,508.—APPARATUS FOR MAKING VINEGAR.—Theodore Grundmann, Milwaukee, Wis.

I claim the arrangement of a series of level troughs, C, provided with holes, a, through which the liquid to be acidified and also a current of air, is conducted, and provided further with plates, b b, whereby the liquor is detained and its course lengthened without interrupting the rapid current of air all made and operating substantially as herein shown and described.

The box, B, wherein the aforesaid troughs are placed, said box being so arranged that it may be easily taken apart and put together, and being provided with holes, d and c, for creating a circulation of air and with dampers, e, for regulating the same, all made and operating substantially as herein shown and described.

63,509.—WASHING MACHINE.—A. W. Hall, New York City.

I claim the tumbling box or cylinder, A, constructed with a series of longitudinal corrugations on convex ribs, operating in combination with smooth stones or balls of other suitable materia', substantially as herein set forth, for the purpose specified.

63,510.—BAG TIES.—Daniel B. Hall, Bucksport, Maine, assignor to himself and Howard Tilden, Boston, Mass.

I claim the bag tie constructed of the strap, A, the plates, B, or their equivalent, and provided with the openings, e e e e, either with or without the eyelets, substantially as described, and to operate as set forth.

63,511.—APPARATUS FOR CARBURETING GAS AND AIR.—Durell Hall, New York City.

First, I claim the coiled condensing pipe, I, used in the gas chamber of the vessel A, and provided with a check valve when used in combination with the pipe, J, and the receiving tanks, K, as and for the purpose specified.

Second, The arrangement of the heater, C, provided with pipes, D and E, with the vessels, A and B, the branching air pipe, G, and the supply pipe, F, as and for the purpose specified.

Third, The arrangement of the receiving tank, K, provided with its guide, e, and discharge pipe, L, with the pipes, J and I, as and for the purpose specified.

63,512.—SURFACE CONDUCTOR FOR ELECTROTYPING.—Samuel Hallock, New York City.

I claim a surface conductor for electrotyping, arranged and operating substantially as herein described.

63,513.—WATCH PENDANT KEYS.—J. A. Hamann, New York City.

First, I claim the pendant, A, having secured to it the spring catch, a, in combination with the key, C, and shouldered pin, F, constructed and operating as described, for the purpose specified.

Second, The key, C, with elongated notch, b, in combination with the spring catch, a, secured within the pendant, A, substantially as described, for the purpose specified.

63,514.—CAR COUPLING.—J. H. Harris, Virginia, Ill.

First, I claim the crank shaft, L, connected to the levers, H H, for the purpose of elevating and lowering the bumper of a car, also to uncouple the same for the purposes and substantially as herein described.

Second, I claim the cylinder, E, provided with notches and pintles, G G, the levers, H H, and crank shaft, L, in combination with the bumper, P, substantially as described.

63,515.—CHURN.—George W. Hawk, Chicago, Ill.

I claim the combination and arrangement of the churn, A, and its cover, the platform, B, the bottoms or cams, a b, the standard, E, the crank, F, wheel, G, and tranverse slotted bar, J, when constructed and operating substantially as set forth.

63,516.—WAGON.—Henry S. Heermance, Claverack, N. Y.

First, I claim the application of india rubber between a wagon body and the cross bars or bolsters upon which it rests, substantially as and for the purposes described.

Second, The application of india rubber between the standards, C C, and a wagon body, substantially as and for the purposes described.

63,517.—UMBRELLA SUPPORTER.—Henry S. Heermance, Claverack, N. Y.

First, I claim the combination of the clamp, D, ball and socket joint, g c, and standard or support, a, in the construction of an umbrella support, substantially as and for the purpose set forth.

Second, The combination of the joints, j k, and the ball and socket joint, g c, in an umbrella support, substantially as and for the purpose described.

Third, The combination of the joints, j k, and m, substantially in the manner and for the purpose described.

63,518.—STEAM GENERATOR.—Thomas Holt, Trieste, Austria.

I claim the hot air chambers or sections, C, inclosing the steam and water tube, B, and inclosed within the boiler, A, constructed and arranged as herein set forth for the purpose specified.

63,519.—SWIFT AND REEL.—G. W. Horton, Belvidere, Ill.

First, I claim the construction and arrangement of the disk, B, B, pivoted to the block, D, and having secured thereto the main bar, C, on which works the slide, d, connected to the arms, A, by the pivoted braces, b, as herein set forth for the purpose specified.

Second, In combination with the above I claim the indicating wheel, E, as herein described.

63,520.—FRICTION WHEEL.—Truman Hotchkiss, Stratford, Conn., assignor to Alfred B. Ely, Newton, Mass.

I claim the loose collar and wheels, constructed and operating substantially as described.

63,521.—MACHINE FOR COILING SPRING.—Swift McG. Hunter, Terryville, Conn.

First, I claim the upright arm, c, with its holding pins, m m, in connection with the rock shaft, d, the latch, b, and the spring, c, arranged and operating as described, in combination with the sliding bar, F, the shaft, A, and the clutch, E, substantially as herein set forth.

Second, I claim also the upright holding rod, l, in combination with the spring, k, the arm, c, and the arbor, B, arranged and operating substantially as herein described.

Third, I claim also the sliding bar, F, in combination with the spring, g, stud, i, and brake, f, and the brake wheel, H, on the driving shaft, A, arranged and operating substantially as described.

63,522.—SLEIGH.—W. H. Huyck, Chariton, Iowa.

I claim the knees, C, composed of two parts, a a, and secured together, one of the parts being bent in a horizontal position, and the other part forming a scoulder upon which the beam, D, rests, as herein set forth, for the purpose specified.

63,523.—MACHINE FOR SHRINKING TIRES.—Caleb Jackson, York, Ill.

I claim an improved tire shrinking machine, formed by the combination of the operating lever, I, shaft, H, and pivoted levers, F, with each other, with the stationary part, A, and movable parts, B, of the machine, substantially as herein shown and described, and for the purpose set forth.

63,524.—PIPE CUTTER.—John V. Jebson, Brooklyn, N. Y.

I claim the use of a scraper, C, in combination with a cutter, B, when the two are arranged in a tool to cut and scrape a pipe or tube, as set forth.

63,525.—REGULATOR FOR WATCHES.—Augustine Jewett, Boston, Mass.

I claim the notched index, C, in combination with the regulator of a watch, when such index is arranged so as to slide or to be moved upon the bridge plate of the balance of the watch, substantially as described and for the purpose specified.

I also claim the combination with the above of the set screw, G, arranged and operating upon the index, substantially as and for the purpose described.

I also claim the regulator pins, a, when attached to the regulator arm, so as to be adjustable therein, substantially as and for the purpose described.

63,526.—LIFTING APPARATUS.—Wilson L. Jones, Baldwin City, Kansas.

I claim the rack beam, E, having platform, D, operating in combination with the cog cylinder, F, provided with a shiftable lever, J, and detent, K substantially as described for the purpose specified.

63,527.—APPARATUS FOR BLEACHING CANE JUICE.—Wm. A. Jordon, New Orleans, La.

I claim the purifying of sulphur gas through water in the manner specified and shown for the purpose of bleaching and clarifying cane juice in a thorough manner by means of the improved perforated revolving cylinder with paddles or buckets combined inclosed in box, F, in the manner herein described and shown by the accompanying drawings.

63,528.—MANUFACTURE OF PETROLEUM SOAP.—Stephen K. Kane, Allegheny City, Pa.

I claim in the process of making soap combining petroleum or other hydrocarbon oil, benzine or other product of such oils with animal grease, or fat, or vegetable oil either with or without the admixture of rosin so as to form a chemical union therewith before adding the lye for saponifying, substantially as hereinbefore described.

Second, The process of making soap by first dissolving rosin in hydro-carbon oil, benzine or other fluid products of such oils; then mixing the solution with melted animal fat or grease or vegetable oil so as to form a chemical union therewith and lastly saponifying the mixture thus formed with lye either with or without the application of heat, substantially as hereinbefore described.

63,529.—MACHINE FOR MOLDING POTTERY.—Anton Keil and John Tresch, New York City.

First, We claim the cam, e, on the shaft, C, for the purpose of raising the plate, g, and flask, D, substantially in the manner herein shown and described.

Second, The combination of the curved flange, h', on the plate, g, with the pin, f, on the crank, e, for the purpose of gradually lowering the plate, g, and flask, D, substantially in the manner herein shown and described.

Third, The construction of the flask, D, so that the plates, d', may be spread apart or closed at will, substantially as and for the purpose herein shown and described.

Fourth, The plate, E', on the pin, K, in combination with the spiral spring and the spring catch, l, for the purpose of raising the ready molded pot, substantially as herein shown and described.

Fifth, The manner of opening and closing the flask, D, by means of the ring, F, and catch, m'', substantially as and for the purpose herein shown and described.

Sixth, The combination of the frame, A, so that one or more flasks and cores may be arranged thereon, substantially as and for the purposes herein shown and described.

63,530.—GRAIN CRADLE.—C. P. Kelsey, Livingstonville, N. Y.

I claim the sockets, E, applied to the fingers, C, cross bars, D, and braces, F, for the purpose of rendering the fingers capable of a longitudinal adjustment, substantially as and for the purpose set forth.

63,531.—SHIRT STUD.—Patrick Kenny, New York City.

I claim the perforated plates, A and B, countersunk on opposite sides forming shoulders in the centers of the plates on which bear pins, D, around which the connecting loops, C, pass, holding the plates together with an unbroken flexible connection, in the manner described for the purpose specified.

63,532.—BORING MACHINE.—Charles B. Knapp, Waterloo, Wis.

First, I claim the pawl, N, hung to the framework, A, in connection with the ratchet teeth of the carriage, I, and operating substantially as described for the purpose specified.

Second, The guide bar or rail, J, arranged to slide at the front end of the carriage and operating in combination with the arm, Y, of the framework, A, substantially as and for the purpose specified.

63,533.—PIANOFORTE MOVER.—D. I. Langworthy, Jamestown, N. Y.

I claim the piano mover consisting of the platform, A, to whose under side the spring lever catches, E, are secured, and bearing the clamps, J, and handles, I, folding supporting frame, B, provided with rollers, H, and having the lower end of the stay rods, c, pivoted thereto, when all are constructed and operating as herein shown and described.

63,534.—WEED CUTTER.—C. G. Lathrop, San Jose, Cal.

First, I claim a weed cutter, made and operating substantially as herein shown and described.

Second, The V-shaped horizontal cutter, I, provided with knives, H, at its ends, substantially as and for the purposes herein shown and described.

Third, The circular revolving colter, G, arranged in front of the plow beam in combination with the cutters, I and K, all made and operating substantially as herein shown and described.

Fourth, The adjustable draft attachment, E and F, in combination with the cutters, G I and K, as set forth.

Fifth, A weed cutter so constructed that either the knives or the wheels on which the whole device is supported can be adjusted up and down so that the cutters can be brought more or less into the ground.

63,535.—SEAT FOR VEHICLES.—G. Lattin and A. F. Hubbell, Coldwater, Mich.

I claim the "bent reclining seat back" for vehicle seats, indicated at T, constructed and fashioned by the combined bending and reducing process substantially as herein described and set forth.

63,536.—SCAFFOLD.—Horace Littlefield, Lewis, Iowa.

I claim a portable scaffold that is made substantially as and for the purpose herein shown and described.

63,537.—SODA FOUNTAIN.—T. A. Long, Meadville, Pa.

I claim the arrangement of the pump, B, the chamber, E, the pipe, C and D, constructed substantially as described in combination with the casing, A, for the purposes set forth.

63,538.—COAL STOVE.—John J. Low, Cleveland, Ohio.

I claim the corrugated or fluted cylinder, G, as constructed and arranged in relation to the apertures, m m, at its base, and to the passages, n n or p, substantially as and for the purposes herein specified,

I also claim an interior perforated lining, H, in combination with said corrugated or fluted cylinder, and apertures at its base constructed and operating substantially as and for the purpose herein specified.

I also claim in a cylinder coal-burning stove the passage of the products of combustion into the lower base, D, at the sides thereof thence forward under the hearth, and finally back through the middle of the base beneath the ash pan to the exit flue or pipe, substantially as and for the purposes herein specified.

63,539.—COAL STOVE.—John J. Low, Cleveland, Ohio.

I claim the perforated curved upper tier blocks, D D, arranged in connection with the blocks, C C, constructed as shown so as to form the air chamber, l l m, substantially as and for the purposes herein specified.

I also claim the arrangement and construction of the whole body of the stove lining, D C C, in connection with the apertures, a or n, in the manner and for the purposes herein set forth.

63,540.—INKING APPARATUS FOR PRINTING MACHINES.—John K. Lowe, Cleveland, Ohio.

I claim the combination of the group of rollers, D C E, and the group of rollers, G H I, with the roller, F, as and for the purpose specified.

63,541.—CARRIAGE FOR CHILDREN.—Tindal A. Madison, Terre Haute, Ind.

First, I claim the combination of the revolving axle, a, with the bolts, d d, or their equivalents, for the purpose of alternately attaching the axle, a, to the carriage wheels, causing them to revolve together and attaching the axle, a, to the side bars, c c, causing the carriage wheel to revolve alone.

Second, The combination of the revolving axle, a, the elastic cord, f f, and the friction pulley, g, or their equivalents, for the purpose described. Also the combination of the axle, a, and the spring, n, for the same purpose.

Third, The combination of the axle, a, the regulating cord, l l, and the friction pulley, m, or their equivalents, acting in concert with the elastic cord, f f, or the spring, n, for the purpose described.

63,542.—PLASTERING TROWEL.—Tindal A. Madison, Terre Haute, Ind.

First, I claim the construction of a plasterer's trowel with the brace, b, to hold the trowel to any given pitch or angle to the surface being covered.

Second, The combination of the gages, n, and thumb screws, d, with the trowel blade, a, and the brace, b, to adjust the trowel to the putting on of the covering material of any thickness required.

63,543.—DEVICE FOR LUBRICATING SPINDLE.—Thomas Marsh, (assignor to himself and D. L. Fales,) Central Falls, R. I.

I claim the oil reservoir C, and conducting tube D, distinct from the bolster in combination with a channel a, cut in the side of the spindle bearing and a suitable absorbent for conducting the lubricant arranged substantially as described for the purposes specified.

63,544.—BOAT DETACHING TACKLE.—G. B. Massey, New York, N. Y.

I clam the vertical rods C, hinged to the boat at their lower end, and pro-

vided with the hooks e, at their upper ends in combination with the blocks D, connecting bar B and lever L, arranged to operate as herein shown and described.

63,545.—SUGAR JUICE EVAPORATOR.—Silas B. Maulsby, Muncie, Ind.

First, I claim the strainer gate B, constructed as herein described and represented and employed to connect the pans together as well as to arrest the passage of the scum, as set forth.

Second, The adjustable elbow tube G, applied and operating in combination with the pans A, in the manner and for the purpose set forth.

63,546.—PROP STICKS FOR PIANOFORTES.—Chas. E. McDonald, Brooklyn.

First, I claim the combination with the hinged prop or props C, and lid or top B, of a weight or weights D, for action in the manner and for the purposes substantially as herein set forth.

Second, The combination, with the hinged prop or props C, lid or top B, and weight or weights D, or a catch or catchers E, so constructed and applied as on closing the lid the weight or weights are automatically released and left free to exercise a lifting action on the props substantially as specified.

63,547.—PIANOFORTES.—Wm. H. McDonald, Brooklyn, N. Y.

I claim the combination with the hinged or pivoted prop C, to the lid B, of a spring or elevating device controlled by a spring and made capable of attachment to or detachment from the case for operation of the prop or props at either end of the latter, substantially as specified.

63,548.—CAR BODY FRAMES.—S. Merrick, New Brighton, Penn.

I claim in the construction of frames of car bodies the iron arched trusses B, the angle trusses C, and the horizontal iron plates e, in combination with the main sills A, the stanchions a, and the cross sills d, arranged substantially as and for the purposes herein described.

63,549.—HAT BLOCKING MACHINE.—S. S. Middlebrook, Sandy Hook, Conn.

First, I claim the construction and arrangement of the vertical shaft A, levers D, cross head C, rubber ring a, perforated disk F, with its edge grooved to receive the metallic rod d, surrounding said levers D, as herein set forth for the purpose specified.

Second, The conical corrugated rollers G H, the teeth of which mesh into each other swinging frame I, bearing the oblique shaft g, and pivoted at its outer end h, to the frame, adjusted by means of the set screw l, when constructed and arranged to operate as herein set forth for the purpose specified.

Third, The rubber ring M, upon the table L, of the frame K, sliding cross head l, and block N, when constructed and arranged to operate as herein set forth.

63,550.—APPARATUS FOR MOLDING AND VULCANIZING ARTICLES OF RUBBER.—John R. Moffitt, Chelsea, Mass.

I claim the construction of the cylinder with a steam chamber, the outer surface of which is made capable of receiving molds or mold boxes of various sizes, substantially as set forth.

Also combining with the cylinder the grooved wheels with swinging follies, and the groove ways in the uprights substantially as set forth.

Also the employment of the friction rings or rolls running in the grooves substantially as set forth.

Also in combination with the mold cylinder and each mold thereof, the hollow steam heated platen or follower.

Also in combination with the platen or follower the bar o, having the mold blocks z, and the platen or follower connected therewith and operated thereby substantially as set forth.

Also the combination of the shafts t w, eccentrics v, and lifters r, for raising the platen substantially as described.

Also combining with each hollow steam heated platen or follower the jointed or movable steam piped for conducting steam into and from the platen, substantially as shown and described.

63,551.—MARKING ATTACHMENT FOR PLOWS.—Charles Morris, Stockton Township, N. J., assignor to himself, George Richards and Stanley C. Hylton, Philadelphia, Pa.

I claim the combination and arrangement of the plough beam A, with the clamp B H, the jointed and reversible bar D K, and the chain M operating substantially as described.

63,552.—CANE, UMBRELLA, PISTOL, DAGGER AND CAMP STOOL COMBINED.—Duncan Morrison, Portland, Maine.

I claim the combination and arrangement in the hollow of the top of the cane, of the pistol and dirk operated and secured as described, with the umbrella and seat in the stock the two parts of the cane being separable and capable of being united, all as and for the purposes set forth.

63,553.—PROCESS OF ENAMELING HARD RUBBER, GUTTA PERCHA.—Ansil, W. Munroe, Rahway, N. J. and Isaac, C. Munroe, Brooklyn, N. Y.

We claim enameling rubber or its allied gums, substantially as described.

63,554.—SPIRAL HAY FORK.—Henry Neumeyer, Millerstown, Penn.

I claim the vertical tines A, shank B, roller or pulleys D, and one or more spiral tines F, in combination with the rope E, support G, lever stop H, and spring I, substantially as described for the purpose specified.

63,555.—GAFF FOR SHIP SPAR.—G. C. Pattison (assignor to himself and Benjamin G. Harris), Baltimore, Md.

I claim guard hooks or plates, combined with the inner end of gaffs or other swinging spars, substantially in the manner and for the purpose herein set forth.

63,556.—STEAMING ON HAT BODIES.—Starr Polley, Brooklyn, N. Y.

First, I claim the levers, B, standing in a conical or pyramidal position during the stretching of the hat body, and provided with damp for holding the body thereon, all constructed and arranged substantially as and for the purpose herein set forth.

Second, I claim the longitudinal corrugations, G* and B*, in the acting faces of the lever and clamps of a hat stretching machine adapted to operate relatively to each other, and to the hat body, as herein described and set forth.

Third, I claim the spring connection, m, arranged relatively to the clamps, G, and levers, B, and their connections, substantially as and for the purpose herein set forth.

Fourth, I claim the carrier, N N, and hat block, O, operating relatively to the pyramidally arranged stretching levers, B, which previously stretch the hat body substantially as and for the purposes herein specified.

63,557.—DRILLING OIL AND OTHER WELLS.—Nelson Pontious, Hallsville, Onio.

First, I claim the clamping arms or jaws, I I, clamping the rope of drilling tools, in combination with the ratchet wheel, F, with which said jaws turn substantially as described.

Second, I also claim the combination of the pawls, L L, the walking-beam, the horizontal ratchet wheel, F, the cams, Q Q, for raising the pawls, L, above the ratchet wheel, F, automatically, and the slotted connecting rod, substantially as described.

Third, I also claim the vertical ratchet wheel, M, and its pawl, in combination with the slotted connecting rod, O, and cams, Q Q, substantially as described.

Fourth, I also claim the orifice, G, through the ratchet wheel, F, and through the bed plate, E, and walking-beam, B, in combination with the hinged clamping arms or jaws, I I, substantially as described.

63,558.—SPIKE AND NAIL.—Aurthur Prentiss, Prentiss Vale, Penn.

I claim spikes and bolts for railroads and other purposes, whether round, square, octagonal or otherwise in form, constructed in two separate pieces, the one provided with roughened side or sides, substantially as described, and to be used conjointly either with or without the timber preservative, as and for the purposes set forth.

63,559.—MACHINE FOR CUTTING STALKS IN THE FELD.—George Pye and F. S. C. Souther, South Boston, Mass.

First, We claim the machine for cutting corn, cane, and other stalks, in the field, constructed arranged and operating substantially as herein described.

Second, We claim also the transverse sliding knives, F F, operated by the cranks, d d, in combination with the pinions, g g, and the concentric toothed rims, h h, on the driving wheels, A A, constructed and operating substantially as and for the purposes herein described.

Third, We also claim the rocking frame, C C, and cross bar, E, in combination with the axle, B, constructed and operating substantially as and for the purposes herein described.

63,560.—BALANCED SLIDE VALVE.—David Pyke, Philadelphia, Pa.

First, I claim the adjustable valves, D D', constructed as described, and the spindle, E, and its nut, t, the whole being arranged in respect to each other as specified.

Secondly, The combination of the two valves, D and D', their studs or bolts, m and m', those of one valve having left-handed, and those of the other valve right handed threads, and the nuts, n, having threads adapted to those of the said bolts or studs.

Thirdly, The upper valve, D, and lower valve, D' the former having a larger area than the latter when the two valves are used in connection with a cylinder having a valve chest on its side, as described for the purpose specified.

63,561.—SELF-OILING SPINDLE FOR SPINNING MACHINES.—F. J. Rabbeth, Ilion, N. Y., and J. E. Atwood, Willimantic, Conn.

First, We claim the bolster, tube and step, B B1 B2, with an oil cup, C, at its upper end, provided with a passage, a, and slot, e, the whole constructed as and for the purpose set forth.

Second, In combination with an oil cup mounted on or surrounding the bolster, the perforated whirr, or whirr sleeve, D', and outer perforated cap, E, for action, as specified.

Third, In combination with the spindle tube, the set screw, F, and packing k, operating to restrain the spindle to its place, and prevent the escape of oil as herein specified.

63,562.—GATE LATCH.—C. W. Rhoads, Indianapolis, Ind., assignor to himself, S. C., and E. O. Frink and H. A. Moore.

claim the combination of the several devices made, constructed and arranged, substantially as and for the purpose herein set forth.

63,563.—TIE FOR BALES.—Stephen O. Ryder, New York City.

I claim the key or pin, c, constructed with an annular tooth or rib, c", in combination with the loop, a', and slot, c', arranged at the opposite ends of the tie or band, substantially as herein set forth for the purpose set forth.

63,564.—MAGAZINE FIRE-ARM.—Peter Sheckler, Orangeville, Ill.

I claim, First, The slot, n, in the rear of the stock for holding the spring plate, E, for the purpose described as specified.

Second, The left-hand block, T, in combination with the breech, Q, for operating the spring guides, U, substantially as described for the purpose specified.

Third, The right hand block, T, in combination with the breech, Q, and hammer, W, substantially as and for the purpose specified.

63,565.—TRUSS.—Jacob A. Sherman, New York City.

I claim, First, A truss spring formed of two or more parts hinged together and retained, at the desired angle, to each other, substantially as specified, so as to regulate the pressure of the spring, as set forth.

Second, I claim the ball joint, i, for attaching and adjusting the pad, in combination with the screw, O, passing through said ball, and taking the inner surface of the cavity as set forth.

Third, I claim the plate, m, formed with radiating levers or fingers to which the padding is connected so that they yield and adapt the pad to the surface of the hernia, as set forth.

63,566.—MEAT AND VEGETABLE CHOPPER.—Eli Smith, Claremont, N. H.

I claim the sides, b b, as constructed, in combination with knives or choppers, c c c, rod, d, and handle, A, as and for the purpose set forth.

63,567.—MEDICAL COMPOUND.—George H. Smith, New Orleans, La.

I claim the composition herein described when the same is compounded of the ingredients herein specified in the proportions as given, for the purpose set forth.

63,568.—BOOTS AND SHOES.—T. Briggs Smith, Boston, Mass.

I claim a pegged boot or shoe in which pegs formed from a twisted polygonal metallic wire and of uniform size throughout their length are substituted for wooden or other pegs heretofore employed.

63,569.—BOOTS AND SHOES.—T. Briggs Smith, Boston, Mass.

I claim a peg or fastening, of uniform size throughout its length, formed from twisted angular wire, substantially as hereinbefore described and shown.

63,570.—MACHINE FOR TWISTING WIRE.—T. Briggs Smith, Boston, Mass.

I claim, First, The adjustable die, T, constructed and operating as described.

Second, The drawing wheel, H, hung in the revolving frame, K, and arranged and operated in the manner specified.

Third, The drum, W, hung in the revolving frame, K, and constructed and operating as set forth.

Fourth, The combination of worm wheel, Y, operated as described, with shaft, X, ratchet, l', and spring, z, in the manner and for the purpose specified.

Fifth, An improved machine for imparting a regular and adjustable twist to wire, constructed, arranged and operating substantially in the manner described.

63,571.—WOOD TURNING LATHES.—Mathias Spenli, Detroit, Mich.

I claim, First, The arrangement of the cutter heads, F F' moving in opposite directions in combination with the head, H, carrying the guide wheel, substantially as and for the purpose described.

Second, The vibrating slotted lever, f, and bolt, e, in combination with the heads, H F, so that the speed of the head, H, in relation to the heads, F F', can be regulated for the purpose specified.

Third, Connecting the oscillating spindle stock, J, with the stirrup supporting the axle of the guide wheel, so that said guide wheel and spindle stock move simultaneously toward and from each other, as and for the purpose set forth.

Fourth, A lathe for turning lasts in which a right and left last are turned simultaneously from a single pattern, when constructed and operating substantially as described.

63,572.—MACHINE FOR MAKING WOODEN EAVES TROUGHS.—A. T. Sterns, Dorchester, Mass.

I claim, First, The arrangement upon the frame, A, of the cylindrical saw, D, oblique saw, H, molding cutters, I J, cutters, K L M, friction rollers, C C and G G, substantially as herein set forth for the purpose specified.

Second, Operating the hollow cylindrical saw, D, by means of driving belt, D', extending from the drum on the shaft, F, around the said saw holding it against the friction rollers, G G, which form its bearings as herein shown and described.

63,573.—HEEL STIFFENER.—Edgar M. Stevens, Chelsea, Mass., assignor to Alfred B. Ely, Newton, Mass.

I claim a molded heel stiffening of rubber or similar elastic material having its upper edge turned over outwardly as and for the purposes set forth.

63,574.—WOOD LATHES FOR TURNING IRREGULAR FORMS.—A. R. Stewart, Douglas Harbor Canning, New Brunswick.

I claim the double carriage, f and f', with their shafts and cutter wheels and traverses arranged and operated substantially as herein shown and described.

Second, I claim the screw, H, the clamp nut, L, and the swinging frame fig. 5, in combination with the double carriage, f and f', operating substantially as herein shown and described and for the purposes set forth.

63,575.—BILLIARD CUE TIP AND FASTENER.—Edgar B. Stocking, Binghamton, N. Y.

I claim the combination of the slits in the underside of tips of rubber or leather and a screen the head of which fits said slits and the body of which is square and fitting a ferrule movable and having a square opening in its center and acting as a wrench and a fixed nut in the billiard cue as above described and for the above named purposes.

63,576.—SLEIGH RUNNER.—Charles Stoddard, Hancock, N. Y.

First, I claim forming the sleigh runner in two parts, A and B, with a dovetailed groove formed in and between them, substantially as herein shown and described and for the purpose set forth.

Second, Forming the shoe, C, with a central projecting dovetailed flange, c' substantially as herein shown and described, and for the purpose set forth.

63,577.—ICE BOAT.—J. B. Stoddard, Baltimore, Md.

I claim the arrangement of the projecting prow, A, and over hanging bow, B, in combination with the paddle wheels with serrated peripheries, substantially as and for the purpose set forth.

63,578.—SINK TRAP.—J. E. Taber, Fall River, Mass.

I claim the valve consisting of the two equally divided jaws, B, forming a cone there joint being at right angles with the top of the trap pivoted at their upper inner ends thereto whereby they close by their own gravity, substantially as described for the purpose specified.

63,579.—WASHING MACHINE.—William A. Terry, Prarie du Chien, Wis.

I claim the combination and arrangement of the lever, K, gear wheel, I, pinion wheel, G, and vertical roller shaft, D, with each other with the supporting standard or frame, F, and with the hinged part of the cover, E, substantially as herein shown and described.

63,580.—CHURN.—Amaletha E. Thorn, Fletcher, Ohio.

First, I claim the churn barrel or chamber, C, provided with the vertical perforated partitions, G, in combination with the plate, A, guide pins, E E', pitman, S, crank, P, shaft, p, and propelling handle, n, or their mechanical equivalents, all arranged and operating substantially as herein described and for the purpose specified.

Second, The air valve or valves, k, in the tubes, K K', or one of them, in the described combination with the elements of the preceding clause.

63,581.—SAW.—E. W. Tilton, Oshkosh, Wis.

I claim forming a concave substantially in the manner herein shown and described for the purposes specified.

63,582.—BURGLAR ALARM.—Jacob G. Trout, Philadelphia, Pa. Antedated March 20, 1867.

I claim the combination of body back and front, F F, nipple, a, rod or hammer and handle, B b, spring, C, right angle groove, l l, screw, e, and all as described and for the purpose set forth.

63,583.—METHOD OF RAISING BENTS IN BUILDINGS.—John Van Gaasbeek, Mount Vernon, N. Y.

First, I claim the two-flanged plates, A B, pivoted together and furnished with suitable appliances, whereby they may be attached to the post of a bent and to the sill, in the manner herein set forth for the purpose specified.

Second, The arrangement of the extremity, a, of the plate, A, with reference to the inner surface of the plate, B, and of the flanged sides of said plates that the said extremity and sides shall serve as guides for directing the tenon on the post into the mortise in the sill, substantially as set forth.

Third, The construction of the plate, B, with the slotted ear, d, whereby the clamping chain, F, or its equivalent, may be adjusted to clamp the plate, B, to posts of any desired size, substantially as herein set forth.

63,584.—DEVICE FOR GATHERING APPLES.—H. F. Wadhams, South Dansville, N. Y.

I claim the canvas, B, secured to the body, A, of the tree to the medium of the belt, A*, straps, a, and secured or held in position by the stakes, C D, all arranged in the manner substantially as and for the purposes set forth.

63,585.—BOAT AND DAVIT TACKLE.—Edgar Wakeman, Brooklyn, Cal.

First, I claim uniting the davit tackle to the boat by means of a hook link, B, in combination with correspondingly-shaped hook strap or bracket, C, when said link or hook strap are jammed and held together by means of a cam or lever, substantially as described.

Second, Uniting and detaching the boat to and from the davit tackle by means of a lever or cam, in combination with the hook link, B, and stop, C, substantially as described.

63,586.—PLOW.—William R. Walpole (assignor to himself, William G. Wood, and John G. Walker), Chicago, Ill.

I claim the combination of the plates, E and F, cam and handle, K H, the standard, D, shovel, S, and rod, c, arranged and operating substantially as and for the purposes specified.

63,587.—TRAVELING BAG.—Zachariah Walsh, Newark, N. J.

I claim the arrangement upon the frame, a, or the plate, B, one or both, of a bent edge adapted to clamp the material at the point of its departure from the frame, the recess adapted to receive the hem being outside of the line of rivets, as herein described and represented.

63,588.—SAD IRON.—J. T. Warren, Stafford, N. Y.

First, I claim the combination of the adjustable heating plug, C, with the hollow shell, A, whereby the smoothing surface of the shell may be heated to a greater or less degree by adjusting the plug at a greater or less distance from the bottom of the aforesaid shell, substantially as herein set forth.

Second, The thumbscrew, b, and supporting frame, D, combined in relation with each other and with the handle, B, heating plug, C, and shell, A, substantially as herein set forth for the purpose specified.

63,589.—COMPOSITION FOR DESTROYING INSECTS.—William Weaver, Phoenixville, Pa.

First, I claim a composition of salt and soda ash to be applied to fruit trees, as and for the purpose set forth.

Second, The above composition, in combination with slacked lime and sulphur, for the purpose specified.

63,590.—SAFETY ATTACHMENT FOR POCKET BOOKS.—Theodore A. Weber, New York City.

I claim the device for the purpose described consisting of a hook, b, spring, d, lever, c, and case, B, in combination with the pocket book, A, substantially as and for the purpose specified.

63,591.—OIL CAN.—J. A. Whitman, Auburn, Me.

I claim the collar, C, forming a cup upon the tube, B, at such a point near its upper end that the oil contained in said cup shall, when the oil can, A, is reversed, flow down the said tube and off its point without overflowing the said cup, as herein set forth.

63,592.—SASH FASTENING.—Jonathan R. Whittemore, Chicopee Falls, Mass.

I claim the cam, H H H, slide, C, and self-acting cam, E E and F, when used in combination substantially as described.

63,593.—SASH FASTENER.—John Wiard (assignor to A. E. Taylor), New Britain, Conn.

First, I claim the bolt, a, provided with pin, d, sliding in the elbow-shaped slot, g, of bolt, e, constructed and operating substantially as described for the purpose specified.

Second, The elbow-shaped slot, g, of bolt, e, through which slides the pin, d, of the bolt, a, and operating in the manner described for the purpose specified.

63,594.—FENCE.—Samuel S. Williams, Sheridan, N. Y.

I claim in combination with the iron staple-shaped post, as my improvement and invention, the ring or square-shaped fastening in the upper end of the post as described.

Second, And in combination with the post and ring in the same, I claim as my improvement and invention the cross bar and manner of fastening the same by means of hooks on the end of the cross bar, as described.

Third, And in combination with the post and ring, I claim the cast or wrought iron holder and brace and the mode of receiving and holding the boards and rails therein, as described.

Fourth, And in combination with the post and brace, I claim the mode and manner of anchoring or fastening the foot of the post in the stone base by turning the end thereof, as described.

63,595.—STEAM BLOWER.—S. R. Wilmot, Bridgeport, Conn.

I claim the steam jet herein described, made of sheet metal and with small slits entering its cavity from the exterior edge of the jet, substantially as specified.

63,596.—CHURN.—George W. Wilson, Freeport, Ill.

I claim the wheel, E, provided with the triangular boards, C C and D, whereby the chambers, F, are formed on each side of the wheel, substantially as and for the purpose specified.

63,597.—LAND ROLLER.—James Winans, Plymouth, Mich.

I claim the two frames, A A, connected together by means of the bars, C C', and bolts, d d, which said bolts act as pivots for the frames, allowing them independent motion, substantially as specified.

63,598.—TABLE CUTLERY.—Walter D. Woods (assignor to himself and Ebenezer F. Woods), Bennington, N. H.

I claim the combination of the blade, the wooden body, B, of the handle, and the metallic encompassing lining, C, cast on the tang, a, and the body, B, in manner and so as to form the bolster, substantially as described.

I also claim the extension of the bolster into and through the tang, when cast upon it and making part of metallic lining to encompass the tang and the wooden body of the handle, as explained.

63,599.—SASH SUPPORTER.—John E. Wootten, Cressona, Pa.

I claim the plate, D, attached to the sash, the pin, E, arm, F, and coiled spring, m, in combination with the plate, G, and its projection, h, on the sash frame, the whole being constructed, arranged and operating as and for the purpose herein set forth.

63,600.—LOCOMOTIVE ATTACHMENT.—John E. Wootten and Henry Hazel, Cressona, Pa.

First, We claim the ram, B, hinged to the bumper beam of a locomotive and arranged to operate substantially as and for the purpose herein set forth.

Second, The combination of the ram, B, connecting rods, c c', lever, f, and vertical shaft, D, the whole being arranged on a locomotive substantially in the manner and for the purpose described.

Third, The said connecting rod made in two parts and connected together by a yielding coupling, all as set forth.

Fourth, The combination of the ram, B, and brace, N, with the pin, b, by which the said ram is hinged to the locomotive.

63,601.—CARRIAGE STEP.—John H. Yager, Trenton, Ohio.

I claim the combination of the two step sections, A and D, the one fixed and the other movable, when arranged together substantially as and for the purpose described.

63,602.—WATER ELEVATOR.—E. L. and W. R. Yorks, Honeoye Falls, N. Y.

First, I claim the combination in water elevators of the double-acting levers, E K, geared together and connected by any suitable spring arrangement, as herein set forth.

Second, The combination of the tension spring, L, with the double-acting levers, E K, so arranged that the action of the spring is simply to expand and contract to operate the levers and to avoid friction, as specified.

Third, The screw blanks, M, in combination with the spiral tension spring, L, for compensating for the loss of elasticity, as set forth.

Fourth, The friction wheel, N, combined with the levers, K E, operating in the manner and for the purpose specified.

Fifth, The stops, K K, combined with the levers, E K, and the clutch, D, as set forth.

REISSUES.

2,535.—SHINGLE MACHINE.—Charles S. Burt, Dunleith, Ill., assignee by mesne assignments of H. H. Low. Patented March 16, 1858. Reissued March 6, 1866.

First, I claim a vertically movable counterbalanced bolt gate, in combination with a circular saw, D, when so arranged and operating that while the saw is stationary the bolt shall be fed up to it, in the manner and for the purpose above described.

Second, The combination of a vertically moving and counterbalanced bolt frame, G, and a head block, K, substantially as and for the purpose hereinbefore described.

Third, Providing a vertically moving bolt frame, G, head block, K, and contrivances for moving said block up to or away from the saw, when arranged and constructed substantially as described.

Fourth, So constructing a machine for sawing straight or tapering slabs from bolts with a circular saw that the table or frame on which the bolts are secured shall be returned, by a movement upward or downward as the case may be, to a position which will admit of the adjustment of the bolt after each cut, substantially as and for the purpose above set forth.

Fifth, The combination of the vertically movable counterbalanced gate and treadle with the head block, K, lever, l, pawls, M, and racks, J, arranged and operating substantially as described.

2,536.—LOCOMOTIVE STEAM ENGINE.—Alba F. Smith, Norwich, Conn. Patented April 5, 1864.

First, I claim in locomotives transmitting motion from the crank shaft, A, to the driving or bearing wheels, E, through the medium of the wheels, U T, of unequal sizes, supported independently of the bearing wheels and maintained in fixed positions relative to each other and to the main framing of the engine so as to be unaffected by the inequalities of the road, substantially as and for the purposes herein specified.

Second, I claim the frictional gearing of the wheels, U T, or equivalent wheel of unequal size intervening between the engine and the driving wheels of a locomotive so arranged as to be both out of contact with the rails, substantially as and for the purposes herein specified.

Third, I claim in connection with the above, mounting the bearings of the crank axle, A, in the same pedestals with the bearings of the driven axle, t substantially as and for the purposes herein set forth.

Fourth, I claim the employment in locomotives of a slight clip or catch, Z, arranged relatively to separate hand levers, J j, or their equivalents, connected each to the same starting and controlling mechanism, substantially in the manner and for the purpose herein specified.

Fifth, I claim in locomotives so constructing and arranging the tanks, W W', that they are of little width but greatly extended in longitudinal and vertical dimensions and are rigidly framed together and to the framing, Q Q, or its equivalent, substantially as and for the purposes herein set forth.

Sixth, I claim in locomotives so constructing and arranging said tanks, W W', that they are of little width but greatly extended in longitudinal and vertical dimensions and are mounted outside of the working gear, substantially as and for the purposes herein set forth.

2,537.—EXPLOSIVE COMPOUND.—The United States Blasting Oil Company, New York City, assignees of A. Noble. Patented Aug. 14, 1866. (Div. A).

We claim nitrine or crystallizing nitro-glycerin produced by the admixture of glycerin, sulphuric acid and nitric acid free or nearly free from hyponitric acid.

2,538.—PROCESS OF PRODUCING AN EXPLOSIVE COMPOUND.—The United States Blasting Oil Company, New York City, assignees of A. Noble. Patented Aug. 14, 1866. (Div. B).

We claim as a new explosive compound the mode or process substantially as herein described, of mixing together glycerin, sulphuric acid and nitric acid free or nearly free from hyponitric acid, and for the purpose specified.

2,539.—REFINING HYDRO-CARBON OILS AND UTILIZING WASTE PRODUCTS THEREFROM.—Henry Pemberton, Allegheny City, Pa. Patented Aug. 2, 1859. Reissued Jan. 1, 1867.

I claim, First, Recovering the sulphuric acid from the residuum of the process of refining coal oil, petroleum and other hydrocarbonats by treating the residuum with water which unites with the acid and replaces and liberates the tarry matter and then separating the tarry matter from the sulphuric acid and water by subsidence.

Second, Agitating water and the residuum of the process of refining coal oil, petroleum and other hydro-carburets together for the purpose of expediting the union of the acid and water and the liberation of the tarry matter.

Third, Purifying the dilute sulphuric acid recovered from the residuum which results from the refining of coal oils, petroleum and other hydro-carburets, by repeated processes of concentration, and dilution with water, whereby the coloring matter is separated, and may be removed substantially as hereinbefore described.

Fourth, The use of sulphuric acid recovered from the residuum resulting from the refining of coal oil, petroleum and other hydro-carburets, for the decomposition of salt in the production of sulphate of soda as a step in the manufacture of soda ash.

2,540.—BEE HIVE.—A. T. Wright, New Vienna, Ohio. Patented June 16, 1863.

I claim the combination of a series of vertical frames f f, with the boards which separate or divide them when the same are clamped together in such a manner as to form a hive with close sides, top and bottoms, substantially as herein specified.

2,541.—DRIVING REIN HOLDER.—B. B. Hotchkiss, New York City, assignee of Milton Whipple. Patented Sept. 4, 1866.

I claim the spring device herein described adapted to operate in holding and releasing the driving reins, substantially in the manner and for the purposes herein specified.

2,542.—PUNCHING APPARATUS.—Norman C. Stiles, West Meriden, Conn. Patented Jan. 26, 1864. Reissued Dec. 26, 1865.

First, I claim the eccentric wrist pin, a, and turning part, b, or its equivalent, constructed and combined as described, to operate the punch at different levels, substantially as and for the purpose herein set forth.

Second, I claim the V-shaped faces, g, in the slide, E, in combination with the jaws, G, cast solid, with the stock, A, and with the triangular gib, h, all constructed and arranged as and for the purpose specified.

Third, I claim the touch off device, k H, arranged in combination with the clutch pin, m, substantially as shown and described, so that said clutch pin is thrown in either direction by the direct action of the cam.

Fourth, I claim the loose catch pin, m, applied in combination with the band wheel, C, and shaft, B, and with the adjustable operating means adapted to move it in and out by a positive motion, in the manner and for the purpose substantially as specified.

Fifth, I claim the button, l, in the shaft, B in combination with the spring catch, k', clutch pin, m and n, and cam, H, arranged substantially as described, so that the cam is released automatically after the punch or cutter has completed its stroke.

Sixth, I claim the yielding coupling pin, n, in combination with the clutch pin m, and touch off device, k, H, constructed and operating in the manner and for the purpose substantially as specified.

Seventh, I claim the yielding fulcrum pin, j, arranged in combination with the cam H, clutch pin, m, and band wheel, C, substantially as and for the purposes set forth.

DESIGNS.

2,608.—CENTER PIECE.—Henry Berger, New York City.

2,609.—END FRAME OF A CAR SEAT.—George Buntin, East Boston, Mass.

2,610.—INKSTAND.—Horace Harris, Newark, N. J.

NOTE.—FIFTY-ONE patents in the above list were obtained through the New York department of the Scientific American Patent Agency, exclusive of quite a number through our Washington agency.—EDS.

Inventions Patented in England by Americans.

[Condensed from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

109.—METER FOR GAS AND LIQUIDS, ALSO APPLICABLE AS A MOTIVE POWER.—Homer H. Stuart, Jamaica, N. Y. Jan. 16, 1867.

290.—CARDING ENGINE.—Seldon L. Crockett and Benjamin T. Mills, Lowell, Mass. Feb. 12, 1867.

296.—SEWING MACHINE.—Elias Howe, Jr, New York City. Feb. 12, 1867.

470.—WHEEL FOR CARRIAGES AND OTHER VEHICLES.—John Raddin, Lynn, Mass. Feb. 21, 1867.

504.—BREECH-LOADING FIRE-ARM.—Isaac M. Milbank, Greenfield Hill, Conn. Feb. 23, 1867.

570.—CUTTING VENEERS.—John B. Wilson, New York City. Feb. 28, 1867.

574.—APPARATUS FOR SEWING AND ORNAMENTING TEXTILE FABRICS AND OTHER LIKE GOODS, AND IN THE APPLIANCES CONNECTED THEREWITH.—George J. Richardson, Philadelphia, Pa. March 1, 1867.

615.—MANUFACTURE OF PACKING FOR THE JOINTS OF STEAM ENGINES, PUMPS, ETC.—Morris Botticher, Newark, N. J. March 5, 1867.

614.—FEED-WATER REGULATOR FOR STEAM BOILERS.—John W. Doughty and Benjamin F. Olmsted, Newburgh, N. Y. March 5, 1867.

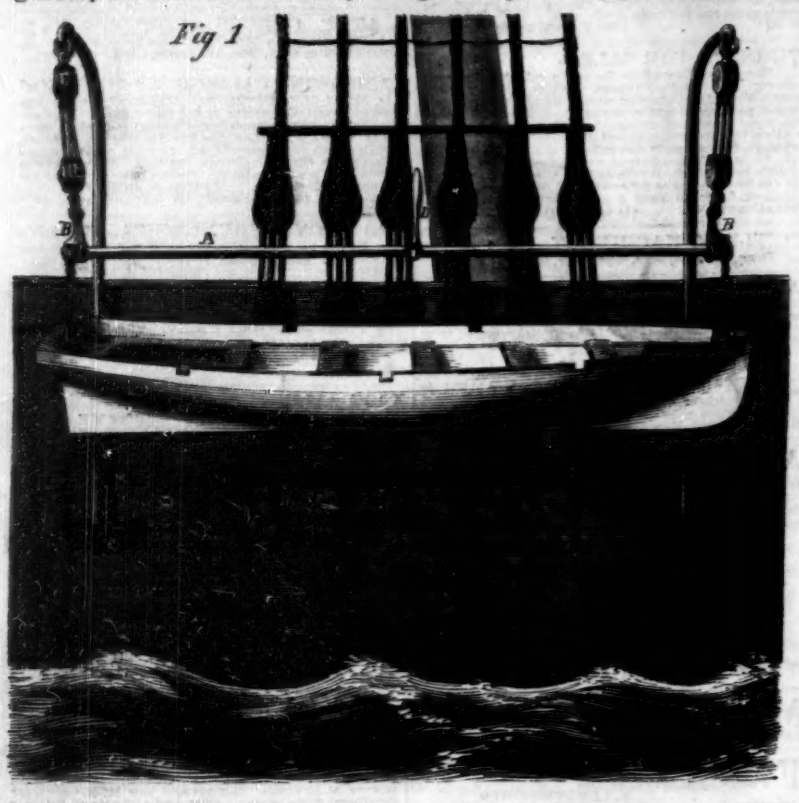
649.—SCISSORS OR SHEARS.—Perez C. Clapp, Boston, Mass. March 7, 1867.

651.—PROCESS WHEREBY LEATHER, OR ANIMAL TISSUE OF ANY NATURE, IS MADE HARD, SEMI-ELASTIC, AND TRANSPARENT.—William Henry Towers, New York City. March 7, 1867.

Improved Boat-Detaching Apparatus.

The terrors of traveling by sea can be greatly mitigated by taking proper precautions for the salvation of human life. In cases of foundering by leaks, or otherwise, the possession of a sufficient number of boats to convey the crew and passengers away from the wreck is not always enough to inspire confidence or to insure safety. The swamping or staving of boats in lowering is too common an occurrence, and not seldom the cause is to be found in the improper tackling by which the launching is effected. A boat when lowered from a ship should strike the water on an even keel and be instantly disengaged from its fastenings, both bow and stern at the same instant. There have been several devices contrived for this purpose but some of them are not certain and unfailing in their operation.

Fig 1

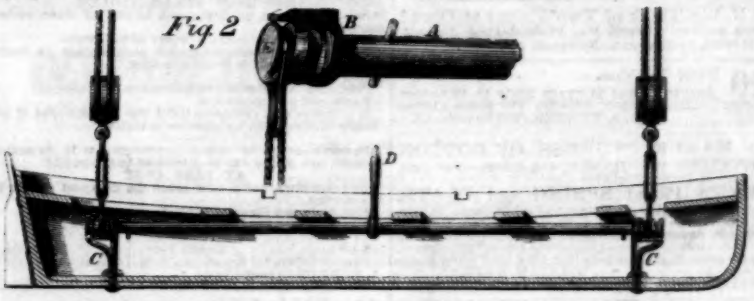


We give two engravings which represent two arrangements of the same plan for securing the safe launching of boats from ships under circumstances of danger. Fig. 1 shows a boat suspended at the davits ready for lowering, and Fig. 2 the section of a boat with the apparatus secured to its bottom inside, and a view, enlarged, of the disconnecting bar. This bar, in which the principle of the device is mainly located, is simply a bar, A, of metal, of a proper length for the boat, slung to the lower blocks of the fall by proper swivels, B, or supported on similar bearings, C, in the boat. The ends of the rod, A, are formed into spirals, or deep threads, one right hand and the other left hand. In these spiral scores rest loops attached to links connected to the boat, or to the lower blocks of the tackle. These loops, when the bar is turned, run in these scores as a nut turns on a screw. The bar has a handle, D, by which it is partially rotated.

Now it will be seen that the loops resting, as at E, in a score nearly at the end of the bar, a partial turn of the handle, D, will throw them off, both at the same instant. Either the bar in the boat passing under the thwarts or that one suspended to the fall can be used, the operation in both cases being the same. The bar can be secured by any simple means so that it may not be tampered with.

Letters patent were granted for this invention to G. B. Massey, of New York City, Feb. 19, 1867. For further information apply to Donald McKay, East Boston, Mass., or to Massey, Shaffer, & Co., 68 Broadway, New York City.

Fig 2



MASSEY'S BOAT-DETACHING APPARATUS.

IRON AND STONE CEMENT.—A German chemist prescribe six parts of Portland cement, one part nicely powdered lime, burnt but not slacked, two parts of sand, and one part of slacked lime, mixed with the necessary quantity of water, used as a filling between stone and iron, both being previously damped. After forty-eight hours the cement will be nearly as hard and durable as stone.